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SUMMARY OF RECENT ABSTRACTS*

VII. HELMINTHIASIS

[*Continued from p.* 695]

NEMATODES

Hookworm infection, Strongyloides, Trichostrongylus, etc.

ORLANDI (p. 530) shows that in the rural population of Milan hookworm infection is fairly common (7 per cent. of a large number examined) and *Ascaris* and *Trichuris* infections even more so. Women are more commonly engaged than men in market gardening, and work barefoot; they show higher rates than men. He describes the symptoms of the infection.

JENKINS (p. 199) found hookworm infection in over 80 per cent. of Papuans at Port Moresby, by direct and flotation methods.

In recent years there has been a great reduction in hookworm incidence in Florida, but HOOD (p. 262) still finds that 40 per cent. of white children are infected, though the infection is heavy in only 3·9 per cent. There is a sharp improvement in the rate at about the age of 20. The danger that service men who served abroad during the war may introduce hookworm infection into the United States is discussed by LOUGHLIN and STOLL (p. 722). They estimate that *Ancylostoma duodenale* was acquired by 2–30 per cent. of men, according to the theatre of war in which they served, but they also note that infection by *Necator americanus* was present in 18 per cent. of men recruited from some southern United States. This reflects poor hygienic conditions, in which it may be possible that *Ancylostoma* may be established.

BENAIM PINTO (p. 99) estimates that more than half of the people of Venezuela harbour hookworms. He describes cardiovascular disturbances in a group of patients with severe hookworm anaemia; some of the patients had other diseases, but some were regarded as having uncomplicated hookworm anaemia, and the cardiovascular disturbances were attributed to this cause.

KHOO and CHIANG (p. 625) refer to previous descriptions of radiological changes in the small intestine due to hookworm infection, and describe the appearances in three of their own cases. Details should be sought in the original abstract.

BECMEUR (p. 450) succeeded in eliminating hookworm infection from a group of miners in Morocco by treating all the moderately and heavily infected men

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1948, v. 45. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

with tetrachlorethylene, and by constructing effective trench latrines below ground, so sited that no worker had to go more than 400 metres to use one. HERNÁNDEZ LIRA (p. 262) uses oil of chenopodium, hexylresorcinol and tetrachlorethylene in the treatment of hookworm infection; he gives details of dosage. In the Philippines it has been customary to give castor oil at the same time as oil of chenopodium, but some prejudice has arisen because toxic symptoms were sometimes produced. GUEVARA (p. 263) notes that there were other ingredients in the mixture, and he therefore tested the matter in cats, and found that castor oil actually reduced the toxicity of chenopodium, and he therefore advises that they should be taken together.

Benzene is used in veterinary medicine in Anatolia, but is not pure; BIYAL (p. 802) has used a pure form in various worm infections of man, with some success. There are slight symptoms of intoxication, and burning sensation unless the drug is emulsified.

DE MORAES (p. 801) has published a thesis on *Strongyloides stercoralis* infection, with special reference to Brazil. WALLACE *et al.* (p. 722) report infection with *Strongyloides fülleborni* in an American soldier who had kept a pet monkey (*Macaca irus*) in the Philippine Islands; monkeys are the usual hosts. GALLIARD (p. 801) argues that geographical races of *S. stercoralis* exist, which vary in their capacity to infect dogs and cats. He cites instances to support his opinion.

LIE KIAN JOE (p. 99) reports *Trichostrongylus colubriformis* and *T. axei* in a considerable proportion of post mortem examinations in Indonesians and Chinese in Java; *T. colubriformis* was much more common than *T. axei*. They did not give rise to symptoms in man, but there was transient eosinophilia. O'NEAL and MAGATH (p. 802) report 3 cases of *Trichostrongylus* infection of man.

PASSOS and BARBOSA (p. 1100) describe a case of infection with *Syngamus laryngeus*, a rare parasite of man.

Ascaris, Trichuris, etc.

In the Cape Verde Islands hookworm infection is very common, and *Ascaris* and *Trichuris* are also often found; *A. perstans* is present in a small minority of people (DE MEIRA *et al.*, p. 1092). FLOCH and DE LAJUDIE (p. 627) have made a survey of intestinal parasites in French Guiana. Comparing their results with those of an earlier survey, they think that the incidence of parasites has fallen, especially of *Ascaris* and *Trichuris*; hookworm infection is common.

TUPAS and MAÑALAC-MORALES (p. 627) report several cases of intestinal obstruction due to infection with *Ascaris*. BEEKHUIS [wrongly attributed to KLASENS] (p. 1100) found *Ascaris lumbricoides* in the Fallopian tube of a patient. DAVIDSON *et al.* (p. 452) have demonstrated that man can be rendered allergic to extracts of *Ascaris lumbricoides* by repeated injection of an extract of that worm.

PANTOJA and BASSÈRES (p. 451) have used hexyl resorcinol in a mass rural campaign against helminthiasis, particularly hookworm and *Ascaris* infections. DEL MUNDO *et al.* (p. 531) have used hexyl resorcinol "crystoids" for *Ascaris* infection, with considerable success, but they note that in a few cases when the "crystoids" were crushed, they produced first-degree burns of the buccal mucosa. LARA *et al.* (p. 351) used a decoction of the seaweed *Digenia simplex* in the treatment of *Ascaris* infection in the Philippines, when other drugs were not available. They describe its preparations.

BALDWIN (p. 921) has tested 200 compounds for activity against *Ascaris* of the pig. For details the original should be consulted.

From Panama Brosius *et al.* (p. 1023) report a case in which ova of *Capillaria hepatica* were found in the faeces.

Toumanoff and Le-Van-Phung (p. 354) report a case of infection with *Gnathostoma spinigerum* acquired either in Indo-China or Thailand. They describe the symptoms. Another case from Indo-China is described by Toumanoff and Nguyen Van Huong (p. 355).

Filarial infections

Pinto and de Almeida (p. 1101) found microfilariae of *Wuchereria bancrofti* in about one-half of the people examined in Portuguese Guinea. *Anopheles gambiae* appeared to be the chief vector. *Acanthocheilonema perstans* was found in 3 per cent. of those examined. Diller (p. 101) found *W. bancrofti* in Liberia, where there is evidence that *Anopheles gambiae* is the vector. *Acanthocheilonema perstans* was found there also.

Galliard (p. 264) has observed complete development of *W. bancrofti* in *Aëdes aegypti*, and of *W. malayi* in *Aëdes aegypti* and *Aëdes albopictus*; early larval stages of *W. bancrofti* were found in *Aëdes albopictus*. Marks (p. 370) notes that *Aëdes kochi* is an efficient vector of *W. bancrofti* in Queensland, but that there is confusion as to its recognition. She has published descriptions of this and related species.

Murray (p. 807) in American Samoa found microfilariae in the blood in about 5 per cent. of children and 50 per cent. of old people. Elephantiasis was not observed below the age of 30. In those with elephantiasis (about 4 per cent. of people over 30) there was a rather higher rate of microfilariae in the blood than in the non-elephantoid population. Franks *et al.* (p. 453) report on *W. bancrofti* infection in Okinawa, where (they think) all persons except very young infants are infected. They used an antigen prepared from microfilariae of *Dirofilaria immitis*, for skin tests, and found that it had a limited value. It does not give many false positive results, but it is often negative in persons with circulating microfilariae, or with elephantiasis.

Chen (p. 1022) reports on filariasis in Fukien Province, China, where microfilarial incidence varies from nil to 30 per cent. Microfilariae of *W. malayi* were found in one-fifth to one-third of the positive cases. Hu (p. 1022) has found that *Culex pipiens* var. *pallens* is a poor vector of *W. malayi*.

Survey work carried out by Butts (p. 352) indicates that Limon on the Atlantic coast is the original endemic area of *W. bancrofti* infection in Costa Rica; *Culex quinquefasciatus* [*fatigans*] is the probable vector. Giglioli (p. 628) has shown that *Anopheles darlingi* is a good vector of *W. bancrofti* in British Guiana.

Clayton Lane (p. 802), before he died, set down in detail his argument on filarial periodicity. His theory was that female *W. bancrofti* each day give birth to large numbers of embryos, which appear in the night blood, and that each day these embryos are destroyed by the reticulo-endothelial cells of the host. He supported his argument by reference to a large number of slides of histological material left by the late Professor O'Connor. The argument is complicated and the reasoning is close, and the original, or the original abstract, should be consulted. Galliard *et al.* (p. 1101) observed the effect of extirpation of adult *W. bancrofti* on the rhythm of periodicity and persistance of microfilariae. General anaesthesia has no effect, and destruction of a considerable number of adult female filariae has little effect on the number of microfilariae. On the other hand, surgical shock and physiological disturbance are capable of exciting immediate and prolonged dislocation of microfilarial rhythm.

Wartman (p. 1020) has contributed a most important paper on the early manifestations of filariasis seen in men of the United States Services who

served in Samoa and other islands. The usual incubation period was 5–18 months, but adult worms have been found within 3 months of first exposure. The most common signs were lesions of the genitalia and lymphadenitis of inguinal, femoral, axillary and epitrochlear glands. Microfilariae were not often found in the blood, but they, or adult worms, were found in 22 per cent. of biopsies ; bacterial cultures of biopsy material were almost always negative. A description of pathological findings is given. Hypersensitivity is probably the explanation of many common symptoms ; intradermal tests were positive in over 80 per cent.

HARTZ and VAN DE STADT (p. 352) describe a case of microfilarial granulomata of the female breast.

ZELIGS (p. 199) shows that the intradermal test for filariasis, in which a saline extract of *Dirofilaria immitis* was used as antigen, could not be relied upon for the diagnosis of *W. bancrofti* infections, since it was negative in 25 per cent. of suspected cases and positive in 19 per cent. of controls. From experiments on skin tests for filariasis in rabbits WHARTON *et al.* (p. 808) conclude that cross reactions with intestinal helminths do not ordinarily occur.

OTTO *et al.* (p. 353), who studied blood levels and excretion rates of persons with *W. bancrofti* infections who were given trivalent or pentavalent antimonials by injection, found that the former compounds had much greater affinity than the latter for red cells. The pentavalent compounds were excreted in larger amounts than the trivalent, immediately after injection, probably because they are not bound to the red cells. Excretion is more rapid at the end than at the beginning of treatment, and the plasma concentrations are maintained for only a short time. It is wise, therefore, to give injections at as short intervals as are compatible with safety ; intervals of 12 or 24 hours are suggested.

CULBERTSON (p. 101) reports work done by himself and his colleagues on the chemotherapy of filariasis. They showed that in *Litomosoides carinii* infection of the cotton rat, pentavalent antimonials kill the adult worms quite quickly, but that the microfilariae persist for months in the blood. In *W. bancrofti* infections of man, neostibosan was the most satisfactory of the antimonials, but none of these drugs was ideal. In *L. loa* infections there was apparently some benefit, but not with *O. volvulus*. In discussion of this paper HAWKING made the point that the longevity of the microfilariae after treatment renders assessment of results difficult unless observation is prolonged. He had found arsenicals even more active than antimonials. ROGERS (p. 264) recalls his early results in the treatment of filariasis with tartar emetic, noting that in some cases the microfilarial counts fell steadily for 3 months after treatment. In these the adult worms had probably been killed. He refers to the work of Culbertson (above) who showed that microfilariae persist for long periods in the blood.

SANTIAGO-STEVENSON *et al.* (p. 353) report that two days after administration of Hetrazan by mouth for 3–21 days, microfilariae of *W. bancrofti* were absent from, or greatly reduced in, the night blood of a group of infected patients in Porto Rico. There was evidence which suggested that the drug had a lethal effect on the adult worms. [See HEWITT *et al.* below.]

The pharmacological properties of Hetrazan are described by HARNED *et al.* (p. 628) ; its toxicity is low.

LOVETT-CAMPBELL (p. 723) discusses the surgical treatment of large elephantoid scrota ; details should be sought in the original. Surgical treatment of elephantiasis of the legs is dealt with by DE REYES PUGNAIRE (p. 922), who describes his operation in detail.

BERTRAM (p. 265) describes his experiments to determine the period required by *Litomosoides carinii* to reach the infective stage in *Liponyssus bacoti*, and

the length of time during which the mite is infective. Transmission is associated with feeding, but the exact mode is not known. Mites are infective within 15 days of the infecting blood meal, and some remain so until the 36th day after the infecting meal. SCOTT (p. 808) has devised a method for infecting cotton rats with relatively constant numbers of *Litosomoides carinii*. WHARTON (p. 103) describes the pathological changes in *L. carinii* infections of the cotton rat. The reactions seem to be due primarily to the excretions of the living worms, and not necessarily to disintegration of dead worms.

HEWITT *et al.* (p. 454) have tested a large number of organic non-metallic compounds in dogs infected with *D. immitis* or cotton rats infected with *Litomosoides carinii*. They describe the techniques and the criteria of effectiveness adopted. The best balance between activity and toxicity was found in the piperazines, administered orally or intraperitoneally. The same group of workers (p. 455 *bis*) report in detail on the piperazine compound 84-L (Hetrazan), which acts directly on microfilariae, producing a rapid and great reduction in their numbers, and also, but less certainly, on the adult worms. It may be given to animals by mouth or peritoneum, and in the doses used it did not display severe toxicity.

Onchocerciasis occurs in the Bahr-el-Ghazal Province of the Sudan, and KIRK (p. 531) found positive skin smears in 19–90 per cent. of people examined in various places, with nodules in up to 46 per cent. and blindness in up to 10 per cent. Hydrocele and scrotal elephantiasis were very common, but infection with *W. bancrofti* was very rare. MAZZOTTI (p. 922) notes that onchocerciasis is prevalent in Mexico, where the vectors are *Simulium ochraceum*, *S. callidum* and *S. metallicum*. He notes that allergic attacks may occur, with fever and local induration of the skin. In treatment he uses Hetrazan in doses of 2 mgm. per kilo. body weight, thrice daily for 3 weeks or more. MAZZOTTI and HEWITT (p. 532) treated with Hetrazan a few patients suffering from onchocerciasis. There was apparently some reduction in microfilariae in the skin, but some nodules extirpated later still contained living adults and microfilariae. NOBLE (p. 354) has examined the tissues of the eye in onchocerciasis, and concludes that microfilariae may be found in all the tissues, but have a predilection for the conjunctiva.

VAN HOOF *et al.* (p. 456) report very favourably on Belganyl (Antrypol, Bayer 205) in the treatment of onchocerciasis. A dose of 1 gramme each week to a total of 7 grammes is usually enough for cure; a total of 10 grammes appeared always to be successful. RUIZ REYES (p. 265), however, has tried Naphuride sodium (which is the same as Bayer 205) in onchocerciasis, but without recognizable benefit.

Various filarial infections (*W. bancrofti*, *O. volvulus*, *L. loa* and *A. perstans*) are present in S.W. Sudan. WOODMAN (p. 627) thinks that although *L. loa* can develop in *Chrysops distinctipennis* and *C. longicornis*, the process is so slow, and the flies are so rarely attracted to man, that some other vector probably exists.

FAIN (p. 100) has carried out a survey of human filariasis in the Banningville territory, Belgian Congo. A focus of *W. bancrofti* infection was found, and several foci of *O. volvulus*. More interest attaches to *Dipetalonema streptocerca* which predominates in the south, but is also found along the Wamba and Kwango rivers. The cause of its distribution is not understood; it does not produce clinical symptoms. *A. perstans* is found throughout, especially in riverside villages; *L. loa* is rare. PEEL and CHARDOME (p. 809) have found *Dipetalonema streptocerca* (*Agamofilaria streptocerca*) in chimpanzees in the Belgian Congo, and describe the adult worms. They also describe the adult *O. rodhaini* from chimpanzees.

DEJOU (p. 1103) shows that cysts containing dead or disintegrated *Dracunculus* may resemble cold abscesses and may be found in patients who have never expelled a worm. He describes 3 cases, in 2 of which the cyst was on the forearm.

Enterobius, Trichinella

GAYTON *et al.* (p. 809) found *Enterobius* infection in 37·6 per cent. of 157 children examined in South Vancouver. All types of families were involved. More than one-third of a series of children examined in Honolulu were infested by *E. vermicularis* (ALICATA and KARTMAN, p. 533), and ANTUNES (p. 629) found 42 children in São Paulo positive for the same worm.

DESCHIENS and LAMY (p. 629) discuss the merits of the various drugs used for *Enterobius* infection. For healthy adult patients they prefer purified phenothiazine, but for children and anaemic adults they prefer subnitrate of bismuth. They discuss the action of gentian violet and other dyes, which are less toxic than phenothiazine. BLOEM *et al.* (p. 201) have treated 123 children with phenothiazine, in *Enterobius* infestation and report good results.

ERHARDT (p. 1023) discusses the drugs which have been used in the treatment of *Enterobius* infection ; he concludes that none is reliable.

The incidence of *Trichinella spiralis* in diaphragms taken at autopsy in England was 10·8 per cent. (YOUNG, p. 355). There was evidence that infection had taken place both recently and a considerable time ago. The fact that cysts of obviously different ages were found in a single cadaver indicated that one infection did not confer immunity.

An outbreak of trichiniasis in a camp of German prisoners of war in the United States was traced to canned bacon and pork, which had been eaten raw. DAVIS and CLELAND (p. 356) report that most of the patients suffered from mild diarrhoea and a condition rather like influenza but with more muscular pain. Eosinophilia was common, and some patients had sub-conjunctival haemorrhage.

STRYKER (p. 457) found adult *Trichinella spiralis*, male and female, in sections of the large and small intestine of a man who died 54 days after eating raw pork ; such a finding is rare. Larvae were extremely numerous in the diaphragm, and were also present in the heart (causing myocarditis) and brain. It is important to attempt to remove adults from the intestine, but anthelmintics are of little use ; the author advocates purgation and perhaps administration of convalescent serum.

In an outbreak of trichiniasis at a military school in Chile NEGHME *et al.* (p. 356) noted that though symptoms on the whole were typical but mild, some patients showed a rash which was at first thought to be that of typhus. SKINNER (p. 630) describes two patients with trichiniasis in whom there were severe mental and neurological changes during the acute stage of the illness ; both patients recovered from the mental changes, but slight neurological signs persisted (for instance unilateral extensor plantar response).

OLIVER-GONZÁLEZ and HEWITT (p. 533) tried Hetrazan in experimental trichiniasis, giving the first dose 24 hours after infection. The results (in rats) indicated considerable effect in reducing adult worms and larvae in the treated animals, compared with controls. *Charles Wilcocks*

MALARIA

ECKSTEIN, Albert. **Malaria in Kindesalter.**

This book is reviewed on p. 881.

APARICIO GARRIDO, J. Estudio parasitologico del genero " Plasmodium". [**Parasitological Study of the Genus** *Plasmodium*.] *Med. Colonial.* Madrid. 1949, June 1, v. 13, No. 6, 465–95, 2 pls. [Numerous refs.]

A general review.

SPANEDDA, A. & FLORIS, M. Sulle forme E.E. del parassita malarico nell'uomo. [**On the E.E. Forms of the Malarial Parasites of Man.**] Reprinted from *Riv. di Malariologia.* 1945, Sept.–Dec., v. 24, Nos. 9/12, 16 pp., 13 coloured figs. on 1 pl. [13 refs.] English summary (4 lines) in *Lavori dell' Istituto d'Igiene d. Univ. di Cagliari 1940–1946.* 1949.

A comprehensive summary of the work on exoerythrocytic schizogony is given, beginning with the speculations of GOLGI in 1893, continuing with the work on avian forms and ending in 1945 on the debatable ground of so-called E.E. forms in human malaria.

The authors investigated 85 cases of human malaria in Cagliari by the examination of sternal puncture material. There were 53 cases of *P. falciparum* malaria (22 primary cases and 31 relapses), 31 of *P. vivax* (10 primary and 21 relapses) and 1 relapsing case of *P. malariae.* So-called E.E. forms were observed in 6 of the *P. falciparum* and 5 of the *P. vivax* cases, both in primary attacks and in relapses, and in febrile and afebrile cases. A coloured plate illustrates the findings. The *falciparum* forms are extracellular bodies, round or oval, slightly larger than an erythrocyte and contain up to 8 masses of chromatin, but no pigment. The cytoplasm is strongly basophilic. The *vivax* forms are of similar type but much smaller, with a maximum of 5 masses of chromatin. The authors obviously studied their results critically ; they examined the bone marrow of 25 patients with no malaria, with negative findings, and concluded that these bodies were not broken-off fragments of cytoplasm of marrow cells but, on the contrary, might be referred to the exo-erythrocytic stage of malaria parasites.

[This is one of the papers which ANGELINI (this *Bulletin*, 1948, v. 45, 24) criticizes on the grounds of insufficient morphological evidence.]

P. C. C. Garnham

MUDROW-REICHENOW, Lilly. Unser heutiges Wissen von der Plasmodienentwicklung im Wirbeltier. [**Our Present Knowledge regarding the Development of** *Plasmodium* **in the Vertebrate.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. [1949], v. 1, No. 1, 113–52, 2 figs. [Numerous refs.]

Since the discovery of the exoerythrocytic development of *Plasmodium* there have appeared numerous reviews of the contemporary state of our knowledge of the life-cycles of the malaria parasites in the vertebrate host. The present paper is one of the most recent and extensive reviews of this subject. It includes works published in Germany during the war years and subsequently, chiefly by the author herself, by Kikuth and by Reichenow, working singly and in collaboration.

These observers have made a number of important contributions to our knowledge of the exoerythrocytic development of the avian malaria parasites, for

which they have not always received the credit they deserve. It is difficult to review adequately a paper which is itself a review: those interested in the subject should consult the original. The following will give some idea of the questions dealt with and of the author's own views.

The first section of the paper is devoted to the exoerythrocytic (EE) forms of the avian and reptilian parasites. A general account is given of their development in various species of *Plasmodium*. It is noted that the special position of *P. elongatum*, which develops in cells of the haemopoietic system, is more apparent than real, for it would seem that in infections following the inoculation of sporozoites this parasite behaves like the other avian species, in that it develops in reticulo-endothelial cells. The initial stages of development of the sporozoite were described independently by REICHENOW & MUDROW (1943) [this *Bulletin*, 1944, v. 41, 190], in *P. relictum*, and by HUFF and COULSTON (1944) [*ibid.*, 1945, v. 42, 538], in *P. gallinaceum*. The German and American authors also showed that there were two types of exoerythrocytic schizogony, one giving rise to macromerozoites which continued the EE cycle, the other giving rise to micromerozoites which invaded the erythrocytes, where they continued to multiply asexually or became gametocytes. In this respect the avian species of *Plasmodium* differ from the human ones and show a closer similarity to *Haemoproteus*. EE development in the chronic phase of the infection occurs in *P. gallinaceum* and *P. cathemerium* but has not been demonstrated for *P. relictum*.

The author next discusses the relation of EE stages to the blood forms, and notes that while sporozoites introduced into the host invariably develop in reticulo-endothelial cells, the inoculation of blood forms gives rise both to EE forms and to erythrocytic stages. The latter are therefore capable of reverting to the former. As regards the bearing of EE development to immunity, some observers have shown that immunity acquired in the course of an infection protects against superinfection and reinfection with both EE and blood forms, while others found that it did not protect against infection with sporozoites of the same strain of parasite. The author believes that in the latter case development does not proceed beyond the earliest EE stages.

The author then turns to the host-cells of avian EE forms, which are primarily phagocytic cells situated in different organs and tissues. Cultures of EE forms in bird embryos and tissues are then dealt with. The culturability of these forms in chicken-tissue apparently depends on the viability of the fowl's macrophages, therefore it is to be expected that those species of *Plasmodium* which invade these cells will readily grow in tissue-cultures.

The second section of this paper is devoted to the Haemosporidia of mammals. Attention is drawn to the special position of the parasites of bats and of *Hepatocystes* of monkeys, in which only gametocytes are found in the blood. The bat parasites seem to have affinities with *Haemoproteus*, while *Hepatocystes* is more closely related to *Leucocytozoon*. A detailed account is given of the discovery of the EE development in *P. cynomolgi*. The success is attributed mainly to the previous discovery by GARNHAM of the asexual stages of *Hepatocystes kochi* in the liver of infected monkeys [this *Bulletin*, 1947, v. 44, 882; 1948, v. 45, 683]. The author supports the view that there is only one pre-erythrocytic generation in *P. cynomolgi*, since it explains the failure to infect other monkeys with liver material during the incubation period.

Finally an account is given of the development of our knowledge regarding the EE stages in human malaria parasites. Their existence was first inferred from circumstantial evidence; this led to prolonged searches by numerous investigators, culminating in the discovery of EE stages of *P. vivax* in the human liver by SHORTT, GARNHAM, COVELL & SHUTE [*ibid.*, 1948, v. 45, 482].

Although the existence in human malaria parasites of an EE development has now been established beyond doubt, a number of questions are still unsolved. Thus nothing is yet known regarding the tissue stages of the other three species of *Plasmodium*; the earliest stages of development of the sporozoites in man have not been demonstrated; it has not been definitely settled whether there are one or more pre-erythrocytic generations, and whether merozoites differing in size are produced. The author and REICHENOW (1949) suggested that since the rapid disappearance of the sporozoites from the circulation is presumably due to phagocytosis by endothelial cells, their initial development, before they invade the parenchymatous cells, probably takes place in the reticulo-endothelial elements of the liver.

In conclusion, it is stated that the new findings throw light on the affinities between various species of *Plasmodium* and on their relationship to *Haemoproteus* and *Leucocytozoon*, which proved to be much closer than was previously suspected. However, a revision of the systematics of the Haemosporidia should not be attempted until the life-cycles of more species of *Plasmodium* from vertebrates are thoroughly studied.

There is an extensive bibliography of works published since 1941: the earlier literature is listed in a previous paper (KIKUTH & MUDROW: *Erg. Hyg.*, 1941, v. 24, 1). [For a full review of the EE schizogony, see also GARNHAM, this *Bulletin*, 1948, v. 45, 831.] *C. A. Hoare*

BOVENTER, K. Ueber das Verhalten der Malaria-parasiten im konservierten Blut. [**The Behaviour of Malaria Parasites in Preserved Blood.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. [1949], v. 1, No. 1, 91–101. [24 refs.]

After noting what others have recorded on the persistence of malaria parasites in blood withdrawn from the body and kept for various lengths of time, the author records his own investigations. The blood was drawn into a solution containing sodium citrate 5 gm., dextrose 40 gm., in a litre of distilled water, the proportion of preservative being 3 : 1 or 10 : 1; it was kept in paraffin-capped tubes in quantities of 8–10 cc., or in larger ampoules holding 250 cc. The subjects were nine patients who had been infected by mosquitoes, 5 with subtertian and 4 benign tertian infections. The blood was kept at 37°C., at 21° and at 4° and was examined at intervals up to 150 days. The morphological changes in the parasites from time to time are noted, their loss of definition, loosening of pigment which may be seen lying free in the corpuscles, change of shape to the semicircular or coronoid form, fragmentation of the chromatin, disappearance of the plasma, etc. These changes take place rapidly, within a day at 37°C., more slowly at 21° and still slower at 4°. The subtertian parasites lived longer than the benign, and even after 100 days the differentiated "resistance" forms of *P. falciparum* were recognizable, and some even at 150 days.

The infectivity was tested by inoculating amounts varying from 6 cc. to as much as 90 cc. (the former intramuscularly, the latter intravenously), using blood kept from 6 to 150 days. Thirty-two inoculations were made, 18 with *P. vivax*, 14 with *P. falciparum* blood. Five infections resulted, 3 with *P. falciparum*, 2 with *P. vivax*. The longest times of preservation to yield a positive result were 13 days with *P. vivax* and 21 days with *P. falciparum*; 10 cc. of the former had been injected and 85 of the latter, both intravenously. ROSE and WOLPERT's record of infection with blood preserved for 90 days the author could not confirm. [The reference for this is given as *Veröffentl. aus d. Gebiet des Volksges.* 17, H.3 (1942).] *H. Harold Scott*

Breindl, V. & Komárek, J. Anofelismus Čech a Moravy. [*Anopheles* **of Bohemia and Moravia.**] *Věstnik C. Zoologické Společnosti v Praze.* Prague. 1940, v. 8, 177–95, 1 text fig. & 5 pls. Summary in Latin.

The following is a translation of the authors' summary :—

1. Two species of *Anopheles*, namely *A. claviger* and *A. maculipennis* are found in Bohemia and Moravia.
2. Only two varieties of *A. maculipennis* are found, namely *A. maculipennis typicus* and *A. maculipennis messeae.*
3. The anophelines are not found free in nature, but almost entirely in stables and human dwellings.
4. *A. m. messeae* is met with most frequently especially in the neighbourhood of fish ponds and the banks of streams.
5. *A. m. typicus* is much less frequent and occurs only in the lower hilly country.
6. *A. claviger* (*bifurcatus*) is found throughout, but principally in hilly regions where aestivo-autumnal malaria might be found.
7. Among the three species, there are neither purely zoophilic nor purely anthropophilic forms.
8. *A. m. atroparvus* has not been encountered so far in Bohemia and Moravia. *H. J. O'D. Burke-Gaffney*

Sepulcri, P. & Mirsa, A. L'*A.* (*mizorhyncus*) *hyrcanus* var. *pseudopictus* in provincia di Venezia. [*Anopheles* (*Mizorhyncus*) *hyrcanus* **var.** *pseudopictus* **in the Province of Venice.**] *Riv. di Malariologia.* 1949, Apr., v. 28, No. 2, 125–7, 2 figs.

The English summary appended to the paper is as follows :—

" The presence of *Anopheles* (*Mizorhyncus*) *hyrcanus* var. *pseudopictus* in the territory of Venice is signalized for the first time. A review is made of the Anophelines represented in the same territory."

McArthur, J. **A New Variety of** *Anopheles aitkeni* **from Borneo.** *Bull. Entom. Res.* 1949, May, v. 40, Pt. 1, 49–52, 2 figs.

Rachou, R. G., Ferreira, M. O. & Ferraz, D. M. Da distribuição vertical dos criadouros dos anofelinos do sub-genero *Kerteszia*, em condições experimentais. [**The Vertical Distribution of Breeding Places of Anophelines of the Subgenus** *Kerteszia* **under Experimental Conditions.**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1949, Jan., v. 1, No. 1, 34–8, 3 figs.

From data collected from the examination of thousands of bromeliads the authors have previously shown that it is the lower plants (less than 2 metres from the ground) which are most often used as breeding places by anophelines of the subgenus *Kerteszia*, and that these lower bromeliads are richer in anopheline life than the higher ones.

In this paper they describe how they fixed bromeliads at different levels on a specially constructed wooden tower 21 metres high. From a study of the vertical distribution of the breeding places of these anophelines in this tower they were able to confirm the results obtained in natural conditions. Figures are given in full and the construction of the tower is illustrated. *H. S. Leeson*

OVERMAN, R. R., HILL, T. S. & WONG, Y. T. **Physiological Studies in the Human Malarial Host. I. Blood, Plasma, "Extracellular" Fluid Volumes and Ionic Balance in Therapeutic *P. vivax* and *P. falciparum* Infections.** *J. National Malaria Soc.* 1949, Mar., v. 8, No. 1, 14–31, 13 figs. [30 refs.]

Physiological and biochemical estimations were made in 70 patients suffering from syphilis of the central nervous system; 42 of them were suffering from induced *vivax* and 28 from *falciparum* infections. The infections were about equally mosquito- and blood-induced. More than half those examined were negroes.

Measurements were made of blood plasma and "extracellular" fluid; erythrocyte volumes; whole blood, plasma, erythrocyte and urine concentrations of sodium, potassium and chloride; urinary volumes and urinary excretion of potassium, sodium and chloride; plasma total protein; haematocrit; changes in body weight, temperature, parasitaemia, etc. The methods used are briefly described; sodium and potassium were measured by the flame photometer, plasma volume by the use of the dye T-1824, a multiple sampling technique being used, extracellular fluid volume by the thiocyanate method.

Control figures were obtained before the induction of malaria. After the controls had been obtained the patients were infected. From then on serial determinations were made during the active clinical stage of the malaria, and in convalescence after antimalarial treatment. The results obtained qualitatively corresponded with those observed by the authors in *P. knowlesi* infections in monkeys. The changes observed are considered in the text against "the number of days of positive parasitaemia." According to the authors, they might equally have been measured against the number of paroxysms or the number of hours of fever. In the general discussion of results those obtained in *vivax* and *falciparum* infections are grouped together since there were no qualitative and few quantitative differences observed in these infections. Controls were considered to be syphilitic patients who had not yet been infected with malaria.

The authors found that parasitaemia rises almost linearly up to the last observation before antimalarial treatment, the linear rise representing the number of hours of fever and the number of paroxysms continued beyond the period of introduction of treatment. There is some confusion here as the figures for each point on the text curves are obtained by taking the average values of "20–50 cases" including in some instances cases in which antimalarial treatment had been begun. The authors' arguments are thus sometimes difficult to follow.

Changes observed in blood volume were equivocal. There was progressive reduction in red-cell volume which became more pronounced after the sixth day of the malaria, and which was usually offset by a roughly equivalent increase in plasma volume. There were, however, cases in which there was a profound reduction in volume. These were suddenly fulminating cases few of which responded to treatment. A diagram illustrating the changes in three of these cases is given.

Extra-cellular volume increased progressively during the disease, as in *P. knowlesi* infection [see this *Bulletin*, 1948, v. 45, 766]. In some cases there was evidence that the cyanate must have entered the tissue cells, because the figure obtained approximated to that of the total body water. This indicated that there was some alteration of permeability of cell membranes, which normally exclude the cyanate.

The authors examined the balance between the tissue fluid and sodium, potassium and chloride of the cells. These ions in whole blood reflected

progressive anaemia. As the haematocrit value fell the sodium rose and potassium decreased. The ionic content of plasma was examined before, during and after paroxysms in *vivax* infections, and the rise of potassium and fall of sodium content during the paroxysm, frequently described by other authors, was confirmed. There was not always any striking *progressive* change in the concentrations of these ions during the disease.

There was, however, a general linear reduction of the average potassium content and an increase in the sodium content of the non-parasitized erythrocytes. This was not statistically significant, probably because the malaria was controlled. It was significant in infections in monkeys which were allowed to run a fatal course. In some of the human cases the changes in sodium and potassium content of the cells were pronounced. A brief account of such cases is given. The authors suggest that there is probably an exchange of sodium for potassium in the uninvaded erythrocytes.

These changes in ionic balance recover apparently only slowly during convalescence. The authors found recovery in some cases took weeks or months, and refer to such slow recovery as " cellular convalescence ".

There was a reduction in sodium chloride output in the urine which was more obvious in fatal malaria in monkeys. In the human cases, unlike monkeys, the potassium output also fell. The authors suggest that possibly in more severe malaria the reverse would have occurred.

Only total plasma proteins were estimated, and these in terms of total protein per kilogramme of body weight. There was no constant loss of body weight, and therefore the rise in total circulating protein reflected the increase in plasma volume. The authors suggest that both water and protein must be added to the blood in malaria, and the reduction observed in total protein can be explained on the grounds of addition of relatively more water than protein.

On the whole, they agree with Feldman and Murphy (*J. Clin. Invest.* 1945, v. 24, 780) that anaemia in malaria is due not only to blood destruction, but also to dilution of the blood, possibly as an intermittent process coincident with the paroxysms.

[This paper is an interesting attempt to cover some of the more obvious gaps in our knowledge of the physiological processes underlying malaria. It contains much useful information, but it is a pity that more details of individual cases have not been given. The authors have grouped their results together in batches of unknown numbers varying, according to the legend under figure I, from 20 to 50. The various stages of the malaria have not been sufficiently clearly separated off. For instance, in one set of figures, the final point seems to include a mixture of both treated and untreated cases. No doubt the authors adopted this method of expression of their results for simplicity's sake, but in a disease like malaria which varies so much from person to person this is unfortunate. The studies over the period of convalescence are not included in this paper ; they are promised in future papers. The reviewer looks forward to further work of this kind.] *B. G. Maegraith*

Riley, J. A. & Robins, G. M. **Leukemoid Reaction due to Mixed Malaria Infection. Report of a Case.** *Blood.* 1949, Mar., v. 4, No. 3, 283–7, 2 figs.

There are in the literature references to the presence of immature cells of the granulocyte series during a malarial paroxysm, but there is only one previous reference given to a definite myeloid reaction in malaria [see this *Bulletin*, 1926, v. 23, 141].

The case presented was that of a negro infected in the Philippines ; about a month after leaving that country he was admitted to hospital in the U.S.A.

with a sharp febrile attack clinically diagnosed as malaria. The diagnosis was not, however, confirmed for about a month and he was not given specific treatment until parasites of *Plasmodium vivax* and *Plasmodium falciparum* had been found in the peripheral blood. (A figure shows *P. falciparum* gametocytes and *P. vivax* trophozoites only.)

On admission, his blood picture was 1·16 million red cells per cmm., 4·0 grammes haemoglobin per 100 cc., and 4,000 leucocytes per c mm. (band forms 14 per cent., metamyelocytes 21 per cent. and myelocytes 11 per cent.). With blood transfusions, the red cell count improved and subsequently, even during the severe febrile attacks of untreated malaria during the next month, there was no return of metamyelocytes or myelocytes to the blood, but band forms varied up to 30 per cent.

On the 6th day after admission, when the temperature was almost normal, a sternal marrow smear showed a marked increase in the early forms of the neutrophil series but few " blast " forms : a tentative diagnosis of myeloid leukaemia was, however, made on the smear. When the malaria parasites were eventually found in the blood, the patient was given a full course of atebrin [mepacrine] and apparently cured. A second sternal marrow smear 12 weeks after the first showed a normal picture. *L. E. Napier*

BLACKBURN, C. R. B. **Observations on the Development of Resistance to Vivax Malaria.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1948, Sept., v. 42, No. 2, 117–62, 15 charts. [23 refs.]

This is a report of work carried out in the Medical Research Unit, Cairns, during and immediately after the war. It deals with the development of tolerance and immunity in healthy volunteers who were experimentally infected with *P. vivax*, and who had not previously been exposed to malaria.

In his introduction the author points out that resistance to *vivax* malaria may be manifested in one or both of two ways :—

" 1. There may be less reaction by the host to a given bulk of infection —tolerance.

" 2. There may be an increased ability of the host to limit the bulk of infection developed—immunity."

The paper is divided into three parts. Part one deals with experiments designed to illustrate the development of tolerance and immunity after mosquito-transmitted malaria. Part two deals with experiments designed to show that the development of tolerance precedes that of immunity, and that immunity is strain-specific. Part three refers to experiments illustrating the development of tolerance after the use of various chemotherapeutic agents.

The paper is very long and detailed, and it would be impossible to deal with it fully in a short review. The interested reader is referred to the original. The author's conclusions may be given in full.

" 1. Tolerance to the effects of *vivax* malaria developed before an enhanced ability to deal with the invading parasite.

" 2. Tolerance and immunity developed in response to *P. vivax* trophozoite activity rather than to activity of exo-erythrocytic forms ; the degree of tolerance and immunity depended on the bulk of the trophozoite experience of the individual.

" 3. Volunteers who had become tolerant to one strain of *P. vivax* showed definite tolerance to trophozoites of another strain of *P. vivax* on their first experience of the second strain. Tolerance to *P. vivax* is not necessarily strain-specific.

" 4. Subjects who had become immune to one strain of *P. vivax* did not exhibit any enhancement of their anti-parasitic mechanism when infected

with trophozoites of another strain. Anti-parasitic immunity may be strain-specific.

" 5. Subjects who had developed complete tolerance and solid immunity to their trophozoites were perfectly fit, had impalpable spleens, and had normal or super-normal haemoglobin concentrations though trophozoites could be found in their circulating blood whenever adequate examinations were made. Attempts to induce malaria attacks by severe chilling and alcoholic excess were unsuccessful.

" 6. Gametocytes were never seen in the peripheral blood of subjects who had developed complete tolerance and immunity to their infection. Mosquitoes were not infected by the blood of these immune subjects."

[Some of the diagrams are difficult to follow. They have been reprinted in so small a form that it is often impossible to read the details. There is some slight confusion in the text with regard to charts 14 and 15.]

B. G. Maegraith

Boyd, M. F. & Coelho, R. D. **A Note on the Apparent Antagonism of a Bacterial Intoxication to a Plasmodial Infection.** *Amer. J. Trop. Med.* 1949, Mar., v. 29, No. 2, 199–202.

A male negro with a diagnosis of meningo-encephalitic syphilis was inoculated by mosquito with *P. falciparum* (Costa strain), on 25th June, 1946. Parasites were first observed on 6th July, and on the following day the temperature first exceeded 100° Fahrenheit. Remittent fever continued until the 11th ; during this period the parasite count slowly increased to reach 2,970 per cmm. on the 11th, which the authors consider a low density for infections with this parasite. A single dose of quinine, three grains, was given on the 9th. The temperature rose to 106°F. on the 14th, and quinine, three grains, was repeated. From then on the parasite density rapidly declined to 10 per cmm. on the 19th. The temperature, however, persisted, and ten grains of quinine were given on the 18th, and two more doses of ten grains were given on the 19th. The blood smear on the following day was negative and parasites were never subsequently observed. On the 19th a crepitant cellulitis in the perineal region was discovered ; the patient was treated with penicillin and tetanus gas-gangrene antitoxin, and the necrotic tissues were drained. *Clostridium welchii* was grown from the exudate of the lesions. The patient eventually recovered, and was watched until 31st July, 1947.

The authors point out that the malaria infection in this case was atypical because the parasites did not attain a density " proportional to the elevations of temperatures experienced ". The plasmocidal therapy administered could not have been sufficient to abort the malaria infection, and they suggest that the gas bacillus infection, which was probably active for some days before its discovery, may have given rise to a soluble exotoxin which adversely affected the malaria parasites.

B. G. Maegraith

Kenyon, R. L., in collaboration with J. A. Wiesner & C. E. Kwartler. **Chloroquine Manufacture. A Staff-Industry Collaborative Report.** *Indust. & Engineering Chem.* 1949, Apr., v. 41, No. 4, 654–62, 5 figs. [22 refs.]

When America entered the recent war she possessed small stocks of quinine and atebrin [mepacrine]. The need for supplies of antimalarials was foreseen and the search for new compounds was co-ordinated by the Office of Scientific Research and Development, whose organization has been described by Wiselogle in " A Survey of Antimalarial Drugs 1941–45 " [this *Bulletin*, 1947, v. 44, 1106]. During the period 1941–46 about 14,000 substances, including

synthetic chemicals and natural products, were screened. One substance submitted for test by the Winthrop Chemical Company was 3-methyl-4-(4-diethylamino-1-methylbutylamino)-7-chloroquinoline (German Sontochin). Tablets found on German prisoners in Tunisia were identified in America as the same substance, which was now designated SN-6911. Work on this group of substances was intensified in the U.S.A. and a related substance, minus the methyl group in position 3 in the quinoline nucleus, was named chloroquine, now Aralen (German Resochin) and was assigned the number SN-7618. Both Sontochin and Resochin had already been synthesized and tested for antimalarial properties in Germany before the War. The former was considered the more active by the Germans but the Americans found otherwise. A number of reports on the properties of chloroquine (Aralen) have been given by the latter authors [this *Bulletin*, 1946, v. 43, 708; 1948, v. 45, 955, 960]. When it became necessary to produce the drug on a large scale, indications of a method of synthesis were available in the U.S. patent literature but details were absent. American chemists evolved new methods of synthesis and one of them is fully described in the present article, along with details of production costs. In this particular plant, the manufacture of 5,000 lb. of Aralen diphosphate per month was attained and improvements are constantly being introduced.

J. D. Fulton

VAN DER WALLE, N. Behandeling van malaria aan de kust van Peru met araleen. [**The Treatment of Malaria with Aralen (Chloroquine) on the Peruvian Coast.**] *Nederl. Tijdschr. v. Geneesk.* 1949, May 21, v. 93 (ii), No. 21, 1698–703.

After describing the American work on chloroquine, a detailed description is given of an investigation by Torres Portugal in two Peruvian sugar plantations. On each plantation about 400 persons were selected and the blood examined for parasites. In one case 20·5 per cent. of those examined were infected, in the other 30·5 per cent. There were 128 cases, of which 80 had benign tertian, 39 subtertian and 7 quartan malaria. Two patients had a combined infection (*P. vivax*+*P. falciparum*).

Of these, 37 patients were treated with another preparation, S.N.8173,5 (7-Cl-4 [3-diethylamine-2-hydroxypropylamine] quinalinebiphosphate); this was found to have unpleasant side-effects and was abandoned. The others were treated with chloroquine, adults having 4 tablets of 250 mgm. chloroquine, children of 1–12, 0·5 gm. and children under one year 0·25 gm. All were treated as out-patients and seen daily. The blood was examined every day until it was negative. If parasites were still numerous the day after treatment was begun, a further dose of 500 or 250 mgm. was given and this was repeated if necessary on the third day. After this every patient had a single weekly suppressive dose of 250 mgm.

Young forms of all three types of plasmodia had always disappeared in 24 hours, adult schizonts in 48 hours and the gametocytes of *P. vivax* and *P. malariae* within 72 hours. The sexual forms of *P. falciparum* did not disappear for 6–10 days.

There was no doubt as to the beneficial effect on clinical symptoms. In every case the temperature was normal in 24 hours and after 48 hours the patients felt well. In 14 cases (mainly women) there were toxic manifestations including abdominal pain, headache, lassitude, dimness of vision, vomiting, giddiness and sleeplessness. None caused any anxiety.

In six cases of benign tertian malaria, suppressive therapy was deliberately omitted after parasites had disappeared from the blood. Relapses occurred after 31–51 days. *A. L. Winner*

Bami, H. L. & Guha, P. C. **Studies in Antimalarials. Part IX. N^1-Aryl-N^5-alkyl-biguanides.** *J. Indian Inst. Sci.* 1949, v. 31A, Pt. 1, 1–7.

Bami, H. L. & Guha, P. C. **Studies in Antimalarials. Part X. N^1-Aryl-N^5-heterocyclic-biguanides.** *J. Indian Inst. Sci.* 1949, v. 31A, Pt. 2, 9–14.

Douglas, B. & Kermack, W. O. **Attempts to find New Antimalarials. Part XXVIII. *p*-Phenanthroline Derivatives substituted in the 4-Position.** *J. Chem. Soc.* 1949, Apr., 1017–22.

Stagg, H. E. **The Determination of Proguanil.** *J. Pharm. & Pharmacol.* 1949, June, v. 1, No. 6, 391–4.

Jelliffe, D. B. **Proguanil Prophylaxis and Intercurrent Infection.** *Lancet.* 1949, June 18, 1052–3.

Previous correspondents in Nigeria referred to a case where 0·1 gm. of proguanil daily failed to prevent a break-through of *falciparum* malaria [see Davey & Smith, this *Bulletin*, 1949, v. 46, 706]. The present author, also in Nigeria, discusses the prophylactic dosage of proguanil and quotes three cases in Europeans to show that 100 mgm. daily may be insufficient in the presence of intercurrent infection.

The first patient, who had been taking this dose daily in the Sudan for four months, developed subtertian malaria, with a positive blood film, during an attack of multiple boils. The second, also in the Sudan, had been taking the same daily dose for two months. She developed proved amoebic dysentery, which cleared up with emetine treatment, but at the end of the treatment she developed an attack of *P. falciparum* malaria. The third patient, in Nigeria, had been taking 100 mgm. proguanil for 5 months. He had lassitude, joint pains and occasional rises of temperature. Physical signs and blood films were negative, but the dose of proguanil was increased to 200 mgm. t.d.s. Five days later bile pigment was found in the urine and a few days afterwards he developed hepatitis. This was probably a virus hepatitis, as his wife had had a similar non-icteric illness three weeks before. He improved rapidly on appropriate dietetic treatment. About two weeks later he suddenly developed a temperature of 101°F. and a heavy blood infection with *P. falciparum* rings.

All these bouts of malaria were mild and short-lived and responded rapidly to therapeutic courses of proguanil, usually 200 mgm. t.d.s. for 10 days.

There seems to be no doubt that all the patients had been taking their proguanil without missing a single day.

The author suggests that until the metabolism of proguanil is better known, the prophylactic dosage should be increased if the patient has an intercurrent disease, however slight. He recommends that at least 200 mgm. should be given daily for malaria prophylaxis both during and in the convalescence following any intercurrent infection. *H. J. O'D. Burke-Gaffney*

Beltrán, E. & Nieto C., V. X. Ensayo del valor de la paludrina en el tratamiento supresivo del paludismo, en Boca del Rio, Ver. [**The Value of Paludrine in suppressing Malaria in Boca del Rio, Ver., Mexico.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1948, June, v. 9, No. 2, 123–32. English summary.

This study of the suppressive action of paludrine against Mexican strains of malaria was carried out on 140 conscripts in a Naval Battalion in Boca del Rio, where malaria is endemic. The men were all 18 years of age. They were divided into four groups each of 35 men. Men of Group A were given 0·10 gm.

paludrine once a week ; of Group B, 0·30 gm. paludrine once a week ; of Group C, 0·10 gm. paludrine twice a week. Group D were controls receiving no paludrine. The experiment lasted 30 weeks from October to May, 1948. The men were kept under medical observation and blood smears were examined weekly.

There was no clinical malaria among the men receiving paludrine. *P. falciparum* was found in the blood of one man in Group A during each of the first four weeks of observation but not afterwards. Another man of Group A had a single positive *P. vivax* smear in the tenth week.

One man of Group B exhibited *P. falciparum* parasites from the fourth to the eighth week.

No positive blood smears were obtained from Group C.

Parasites were found in 8 men of the control group in which there were 6 cases of clinical malaria, one *P. falciparum* and 5 *P. vivax*.

During the spring recrudescence of malaria no man receiving paludrine had a parasitaemia.

Two weekly doses, each of 0·10 gm., gave the best results. *Norman White*

SHELLEY, H. & AZIZ, M. **Anopheles Eradication in Cyprus.** *Brit. Med. J.* 1949, Apr. 30, 767–8.

A brief history of malaria in Cyprus is given. *Plasmodium falciparum*, *P. vivax* and *P. malariae* infections have been recorded from the island. The vectors against which the present eradication scheme was directed were *Anopheles superpictus*, *A. elutus* [*sacharovi*] and *A. bifurcatus* [*claviger*].

An anti-larval campaign was begun in April, 1946, and anti-adult measures against hibernating adult anopheline mosquitoes were instituted from the winter of 1946–7 onwards ; effective eradication of these vector species from the island has apparently been obtained. No anopheline adults nor larvae have been found in the thirteen weeks preceding the preparation of the present report. It is thought that, apart from maintenance measures, the campaign can be terminated during the summer of 1949.

In 1944, 7,686 cases of malaria were reported in Cyprus but this figure had dropped to 406 in 1948 and of these only three were considered to be of recent origin. In school children splenomegaly and parasitaemia dropped from 32·4 per cent. and 51·9 per cent. respectively in 1944 to 10·6 per cent. and 1·3 per cent. respectively in 1948 ; in 1948, 655 infants (under 2 years of age) in formerly highly malarious villages were found to be negative for parasites.

Occasionally " Malariol ", Paris Green, and fuel oil were used in the anti-larval work, but the greater part of the larval control was achieved by the use of 3–4 per cent. DDT in gas oil. Winter control of adult mosquitoes was effected by " light treatment with DDT " of resting places. Later, in 1948–9, DDT and " Gammexane " smokes were employed against adults in buildings with high ceilings and for other inaccessible places. Considerable efforts were made to trace and to treat adult resting places in caves, tombs, tree trunks, etc., and to deal with all breeding or resting places besides those in or adjacent to centres of habitation. Indeed, every effort was made to destroy the adults and the larvae of anophelines in every part of the island. A brief account of the organization involved is given. The island was divided into six districts and these were subdivided into 39 sections, 111 zones and 556 blocks. A block comprised an area which could be covered by one man in a period of twelve working days.

Observations on the effectiveness of the control measures were made not only by the staff responsible for the work but also by independent observers.

The estimated cost for the campaign was given as £310,000. [See also this *Bulletin*, 1949, v. 46, 16.] *D. S. Bertram*

Field, J. W. & Edeson, J. F. B. **A Note on Presumed Exo-Erythrocytic Development of *Plasmodium vassali* in the Liver of the Malayan Squirrel.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, May, v. 42, No. 6, 569–72, 8 figs. on pl.

A pigmented parasite of the red blood cells of Malayan squirrels was studied. The organism was thought to be probably the same as that described by various authors as *Plasmodium vassali* from squirrels in Indo-China, India and Malaya. Seventy-nine squirrels belonging to four species of *Callosciurus* and one species of *Lariscus* were examined and 68 were found to harbour the infection, some very heavily. Gametocytes only were observed in the blood stream. The surface of the liver in many of the infected animals was studded with cysts, smears from which showed innumerable merozoites. Schizogony was not observed in the brain, lung, spleen, bone-marrow and kidney, nor in the peripheral blood. The liver cysts measured up to 840 μ in diameter, and closely resembled the merocysts of *Hepatocystes kochi* [this *Bulletin*, 1948, v. 45, 683], a parasite of African monkeys. The cyst was a smooth, round, translucent body with an outer wall of compressed liver parenchyma, sometimes containing giant and other inflammatory cells and surrounding a rim, 50 μ wide, tightly packed with merozoites. The interior of the cyst contained amorphous material. Smears made from a cyst showed an immense number of merozoite-like structures, mostly single, but sometimes multiple, together with extracellular dividing forms with two to six or more segments of chromatin.

[The authors conclude the paper by asking various questions regarding the systematic position of this parasite of the squirrel. Although its early asexual stages remain undescribed, it would appear to the reviewer justifiable to call it *Hepatocystes vassali* and to regard the cyst-like liver structures as the mature asexual forms of the parasite.] *P. C. C. Garnham*

Paraense, W. L. **The Latency in Lophurae Malaria of the Chicken.** *Mem. Inst. Oswaldo Cruz.* 1948, Mar., v. 46, No. 1, 81–7, 7 graphs. [Portuguese version 73–81.]

P. lophurae malaria is primarily a disease of the fire-back pheasant; in the duck it causes a virulent infection, in the domestic fowl the disease is usually said to run a mild and self-sterilizing course. The Rockefeller strain was maintained in Brazil by intravenous inoculations of infective blood into chicks 5–20 days old. The infection reached a peak of parasitaemia of about 3 per cent. by the eighth day and subsequently declined rapidly. Subinoculations of 0·25–0·5 cc. of blood were performed up to 330 days after inoculation, and all the birds developed low-grade infections. Quinine treatment of the initial attack scarcely affected the eventual survival of parasites, 4 out of 5 birds passing into the latent stage which lasted for at least as long as 136 days after the original quinine treatment.

The well-known phenomenon of increase in virulence after rapid transfers was again observed in *P. lophurae* in chicks, the parasitaemia eventually reaching over 70 per cent. and proving fatal. *P. C. C. Garnham*

McGhee, R. B. **The Course of Infection of *Plasmodium gallinaceum* in Duck Embryos.** *J. Infect. Dis.* 1949, Jan.–Feb., v. 84, No. 1, 98–104, 2 figs. [10 refs.]

Adult ducks are only slightly susceptible to infections with *Plasmodium gallinaceum*. Tests were made to observe the behaviour of the parasite in duck embryos. Blood containing a known number of parasites was inoculated intravenously into duck embryos of various ages. (All attempts to transmit

a blood infection by inoculation into the chorio-allantois were unsuccessful.) The younger the embryo, the more severe was the resultant infection, though all became infected in the end : 14-day-old embryos were all killed by the disease; 20-day-old embryos nearly all died ; at 26 days, all the infections progressed to a crisis, with development of acquired immunity and recovery, while 2-day-old ducklings responded with only transient low-grade infections. Sporozoite infections were initiated by the intravenous inoculation of infected salivary glands from *Aëdes aegypti*, ground in a mixture of chicken serum and saline. Such infections were studied in 14- and 20-day-old duck embryos. They were all accompanied by a heavy tissue parasitism (in liver, spleen, heart and brain) which killed the embryos uniformly ; in the blood, in addition to the ordinary pigmented schizonts, unpigmented forms were found free or in basophil erythroblasts, polychromatophil erythroblasts, lymphocytes and neutrophiles. The author points out that there is a series of adaptations of the parasite, after its liberation from the fixed tissue elements—it first shows a preference for cells of the lower erythrocytic series and for lymphocytes, and later a major alteration in its physiology allows it to develop in the mature erythrocytes where it forms pigment and becomes more susceptible to the immune processes of the host. *P. C. C. Garnham*

McGhee, R. B. **Pre-Erythrocytic Development of** *Plasmodium gallinaceum* **in Avian Embryos.** *J. Infect. Dis.* 1949, Jan.–Feb., v. 84, No. 1, 105–10, 12 figs. on pl. [10 refs.]

Pre-erythrocytic forms of *Plasmodium gallinaceum* are readily obtained by the inoculation of sporozoites into chick embryos 12 to 16 days old. Infected salivary glands of *Aëdes aegypti* were implanted on the chorio-allantoic membrane (usually at a vein bifurcation), intramuscularly in wing or leg buds, or elsewhere in the body, and intravenously after grinding. The course of development followed closely that described by Huff and Coulston [this *Bulletin*, 1945, v. 42, 538] in wing skin. Only a few sporozoites managed to survive to start the cycle ; there was a rapid dispersal from the reaction area, and normal development took place in the macrophages. By 24 hours, the chromatin of the cryptozoite divided into two masses and a well-defined vacuole surrounded the parasite as it lay in the cytoplasm of the host cell. By 36 hours there were 30 " nuclear structures " ; at 40 hours, all nuclear differentiation was lost and clefts appeared, followed by separation into oval merozoites with pointed ends arranged radially around a central core. The metacryptozoic generation matured about 70 hours after inoculation and resembled the corresponding stages of cryptozoite development. Similar stages were seen in the vascular endothelium of the organs ; the clefts in the cytoplasm of mature schizonts were more noticeable and gave the appearance of cytomere formation. In these organs, even as long as 9 days after infection, synchronicity of development was well marked, and this finding was the main point of difference between infections in embryos and in the wing skin of adults where lack of periodicity is apparent even after 70 hours. Macro- and micro-merozoites were produced by exo-erythrocytic segmenters in the spleen. *P. C. C. Garnham*

Nadel, E. M., Taylor, D. Jane, Greenberg, J. & Josephson, E. S. **Adrenal Hypertrophy in Chicks infected with** *Plasmodium gallinaceum*. *J. National Malaria Soc.* 1949, Mar., v. 8, No. 1, 70–79, 5 figs. [24 refs.]

Changes in the adrenal glands during the course of *Plasmodium gallinaceum* infections in chicks were observed. Week-old chicks were inoculated intravenously with blood containing 1,000 parasitized erythrocytes, and the

following observations were made : weight of birds, red blood counts, degree of parasitaemia and the weight of the adrenals taken from chicks at different stages of the infection. Similar observations were carried out on an adequate number of control birds kept under identical conditions. The glands were removed first by a block dissection of an area about 2 cm. square and subsequently under a low power lens, the ovoid orange adrenals were isolated from the ovaries, connective tissue, etc. A dissection could be completed in 10 minutes.

The results were assessed in relation to body weight and were compared with a similar relationship in normal birds. In the latter, the weight of the adrenals is directly proportional to the body weight. Up to a parasitaemia of about 50 per cent., there is scarcely any hypertrophy of the adrenals ; but beyond that density, the glands show a marked increase of weight—on an average they are twice as heavy at the peak of parasitaemia and in one chick, were five times as heavy. With the decline in the blood infection, the glands revert to normal size. The increase in weight was shown to be due not merely to fluid but to an increase in tissue elements. Hypertrophy of the adrenals is known to be caused by starvation, but this was proved not to be the explanation of the results in the case of chicken malaria. There are coincidental maxima of anaemia and of adrenal hypertrophy—the authors refrain from ascribing this to cause and effect.

[The authors state that material was taken for histological study, but the results are not recorded in this paper. They might well throw light on the possible aetiological association between malaria and Addison's disease which has been reported on a number of occasions after severe infections with *P. falciparum* in man.] *P. C. C. Garnham*

BLACKWATER FEVER

Rigdon, R. H. **Hemoglobinuria (Blackwater Fever) in Monkeys. A Consideration of the Disease in Man.** *Amer. J. Path.* 1949, Mar., v. 25, No. 2, 195–209, 7 figs. on 2 pls. [36 refs.]

This report is concerned with the clinical and renal pathological findings in 10 rhesus monkeys (out of 27 infected) which developed haemoglobinuria after intraperitoneal, subcutaneous and intravenous injection of parasitized blood (*P. knowlesi*).

In the kidneys of monkeys in which haemoglobinuria continued to the time of death, there were few changes in the glomeruli, but the epithelial cells of the convoluted tubules were always damaged. These cells were sometimes swollen to the point of occluding the lumen, sometimes fragmented or desquamated into the lumen. Small masses of yellowish-brown pigment (occasionally staining faintly with Prussian blue) were present in the cytoplasm and similar masses appeared in the lumina of the tubules. The epithelium of Henle's loop was desquamated, especially in the region of large casts. Casts were present in varying numbers. They were sometimes large homogeneous and pink-staining, and sometimes composed of groups of deep eosin-staining granules, approximately equal in size to a red blood corpuscle, sometimes considerably smaller. Other tubules contained amorphous yellowish-brown material. Casts were present in large numbers in the collecting tubules and sometimes in the convoluted tubules. There was no significant change in the interstitial tissue. The small blood vessels were filled with parasitized cells but there

were no specific vascular lesions. In one monkey, which was killed shortly after recovery from haemoglobinuria, the kidneys were normal in size and colour, and no casts were present.

According to the author, younger monkeys with severe infections were especially prone to develop haemoglobinuria, the appearance of which was influenced by the severity of the infection. The CO_2-combining power was estimated in one animal. It was low, suggesting a severe terminal "acidosis". The presence or absence of either oliguria or anuria was not determined in these experiments, but the author discusses the incidence of these phenomena in monkeys and in blackwater fever in man. He considers that the amount of material within the lumina of the tubules is insufficient " to produce anuria in the manner suggested for cases of the so-called ' lower nephron nephrosis'. " Anoxia and shock are probably more important factors. He points out that in severe malaria symptoms of shock may occur and that glomerular filtration, since it is influenced by blood pressure, is probably significantly decreased in the presence of shock. He suggests that such a mechanism is " more significant in producing anuria in blackwater fever than obstruction in the lumina of the tubules."

[The author was one of the earliest to stress the importance of anoxia in the pathogenesis of malarial lesions. His views on the production of anuria are in line with those recently expressed in a considerable volume of literature which is not discussed in this paper. Interested readers are referred to the original.] *B. G. Maegraith*

TRYPANOSOMIASIS

HORNBY, H. E. **Electrical Charge of Trypanosomes.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, May, v. 42, No. 6, 626–8.

This paper deals with experiments designed to test the validity of a method for determining the electric charge of trypanosomes, described by FAIRBAIRN and CULWICK [this *Bulletin*, 1947, v. 44, 649]. According to these observers, this can be done in a thin stained blood film, by noting the position of the trypanosomes in relation to the erythrocytes : those in contact with the cells are said to be positively charged, while those not touching the red cells are negatively charged. It is also claimed that the results obtained by this method and by the salt-concentration test [this *Bulletin*, 1937, v. 34, 511] are in close agreement.

The author doubts this contention on purely *a priori* grounds : " In view of the very short time required for the making of a thin film, and the relatively terrific mechanical forces to which the blood ingredients are submitted when the blood is spread, it would appear strange that trypanosomes—which are not adherent to red cells in the circulating blood—should within a second or two of release from the circulation, and while submitted to violent mechanical disturbance, be able to orientate themselves in any way that is not dictated by this disturbance."

The author then describes experiments, in which he and other observers at Mpapwa carried out parallel tests by both methods with a Tinde strain of *Trypanosoma rhodesiense* maintained in guineapigs, which at different periods showed a great predominance (80 to 100 per cent.) of trypanosomes carrying a charge of the same sign. Whereas there was complete agreement between these observers regarding the charge on the trypanosomes examined by the

saline-glucose method, their results were completely at variance when the thin film method was used. Thus, in one experiment, two observers agreed that 97 per cent. of the trypanosomes tested by the former method were negatively charged, but when they examined the position of the trypanosomes in stained films, one of them reported 93 per cent. and the other 29 per cent. of the trypanosomes as bearing a negative charge.

The author concludes " that the positions of trypanosomes in thin films are governed entirely by the action of the glass spreader : the closer together the elements of the blood, the more likely are the trypanosomes to touch cells ; the more widely the red cells are scattered, the more likely is a trypanosome to lie detached from all other cellular elements."

[The reviewer is informed of a similar experiment carried out in Britain, in which the observer failed to confirm the results obtained by the glucose-saline test, when he attempted to determine the charge of trypanosomes of the corresponding strains in blood films.] *C. A. Hoare*

FAIRBAIRN, H. & CULWICK, A. T. **The Differentiation of the Polymorphic Trypanosomes.** *Ann. Trop. Med. & Parasit.* 1949, Apr., v. 43, No. 1, 90–95. [15 refs.]

The authors have made a biometrical study of the polymorphic trypanosomes with the view to detecting morphological differences which would serve as a basis for the differential diagnosis of *Trypanosoma gambiense*, *T. rhodesiense* and *T. brucei*. For this purpose they employed 5 strains of *T. rhodesiense*, 4 of *T. brucei* and one of *T. gambiense*. All the strains, except one, were transmitted by *Glossina*, and the metacyclic forms were recovered from these flies by induced salivation. Measurements of length were made of both the blood and metacyclic forms of the trypanosomes, in preparations stained by Giemsa's method. The blood forms were obtained from dog, monkey, gazelle, and from rats and guineapigs inoculated from these hosts and from man and sheep. The results of measurements of several hundred flagellates in each of the normal strains are given in two tables, which can be summarized as follows (Table A) :—

TABLE A.

Mean Lengths (in μ) of Polymorphic Trypanosomes. (Figures in italics represent the mean of means.)

	T. rhodesiense	*T. gambiense*	*T. brucei*
Blood forms :			
Short	18·35–21·90 *19·22*	19·26–20·99 *20·30*	18·56–20·36 *19·31*
Intermediate	22·81–24·25 *23·54*	22·88–24·58 *23·59*	22·92–24·57 *23·71*
Long	28·56–30·33 *29·45*	28·02–30·62 *29·06*	28·25–30·68 *29·23*
Metacyclic forms	16·38–18·11 *17·36*	14·17–15·93 *15·24*	16·24–18·34 *17·62*

Among the trypanosomes used in this study there were also two strains of *T. brucei*, No. 8 and No. 9, which behaved very differently from the other strains of this species. The measurements of the atypical strains on different dates were as follows (Table B) :—

TABLE B

Mean Lengths (in μ) of atypical T. brucei

	Strain 8	Strain 9
Blood forms :		
Short	16·48, 17·18	18·23, 16·81, 14·96
Intermediate	21·12, 23·48	22·77, 23·73, 21·25
Long	26·77, 29·42	26·53, 29·02, 26·00
Metacyclic forms	15·21–16·56 *15·68*	14·99–16·21 *15·69*

In discussing the results the authors point out that the polymorphic trypanosomes examined by them fall into two groups. In one (shown here in Table A) represented by 5 strains of *T. rhodesiense*, 2 of *T. brucei* and one of *T. gambiense*, the length frequencies of the various forms tend to normality, while the mean lengths are similar and fluctuate only within small limits. However, the mean length of the metacyclic forms of *T. gambiense* is significantly shorter than that of the other two species, and can serve to differentiate it from the latter.

In the second group (shown here in Table B) are strains 8 and 9 of *T. brucei*, in which the mean length of the blood forms " fluctuates widely, and the length-frequency distribution curves are often abnormal, suggesting a mixture of two or more components ". The mean lengths of the metacyclic forms in these strains are also significantly shorter than those of the strains of *T. brucei* adduced in Table A. Further investigations indicated that measurements comparable to those in *T. brucei* strains 8 and 9 were obtained in a mixed experimental infection of rat with *T. rhodesiense* and a " normal " *T. brucei*. The significance of this finding will be discussed by the authors in a future publication.

The authors record other interesting observations on *T. brucei* carried out in the course of this work. In the case of three strains, which were recovered from dog, wild tsetse fly and camel, respectively, the identification of the species was checked by inoculation of human volunteers. The canine strain was tested very thoroughly by allowing heavily infected *Glossina morsitans* to bite 10 men, some of them repeatedly. When none of the men became infected they were inoculated subcutaneously from infected rats, each man receiving from 600 thousand to 42 million trypanosomes. Again not a single infection resulted. The other two strains likewise failed to produce an infection in man. [The first of these tests is perhaps one of the most thorough experimental attempts to infect man with *T. brucei*.] *C. A. Hoare*

SPINKS, A. **Fluorimetric Determination of " Antrycide ".** [Correspondence.] *Nature*. 1949, June 18, 954.

A preliminary note.

PELLEGRINO, J. O perigo da transmissão da doença de Chagas pela transfusão de sangue. Primeíras comprovações sorológicas de esquizotripanose em doadores e em candidatos a doadores de sangue. [**The Danger of transmitting Chagas's Disease by Blood Transfusion. Evidence of the Disease in Blood Donors.**] *Brasil-Medico*. 1949, Feb. 19 & 26, v. 63, Nos. 8/9, 63.

The English summary appended to the paper is as follows :—

" It is surprising that the danger of inoculating Chagas' disease through blood-transfusion has not yet been duly considered, and that apparently

nothing is being done in order to prevent it. This danger is a real and serious one for the following reasons: Chagas' disease and its natural vectors are widely spread in this continent and in large rural areas this infection is exceedingly frequent; most doctors are not aware of it; infection lasts for many years, apparently is not susceptible of spontaneous cure and there is no effective treatment for it; while many cases may stay symptomless for a long time, a large proportion of infected people show severe heart trouble: *Schizotrypanum cruzi* is easily transmitted through the inoculation of blood into susceptible hosts.

" The writer reports for the first time the occurrence of Chagas' disease among people serving as blood-donors in Belo Horizonte, Brazil. Three individuals were found which exhibited a strongly positive complement-fixation test (*S. cruzi* culture antigen). Formerly they used to live in mud-huts with triatomid bugs in the interior of Minas Gerais; two showed no signs or symptoms of Chagas' disease, but one showed heart trouble (right bundle-branch block).

" The writer emphasizes the necessity of preventing the dangerous possibility of the spreading of Chagas' disease through blood transfusion. He suggests that the complement-fixation reaction for *S. cruzi* be necessarily performed in all individuals before they are admitted as blood-donors, in the countries where the disease is known to occur. People exhibiting positive or even doubtful tests should be obviously discarded."

Pelloux, A. & Decourt, P. Toxicité du S.P.N. ou sulphos (thiophosphate o′ diéthyl o″ paranitrophényl) sur des triatomides vecteurs de la maladie de Chagas. [**Toxicity of Thiophosphate o′ diethyl o″ paranitrophenyl ('Sulphos') on Triatoma Vectors of Chagas's Disease.**] *Bull. Soc. Path. Exot.* 1949, v. 42 Nos. 1/2, 22–5.

The authors describe experiments in which S.P.N. was used as a powder and as an emulsion against *Triatoma infestans*: S.P.N. is thiophosphate o′ diethyl o″ paranitrophenyl and is also known as " Sulphos ".

(1) Groups of five insects were confined in Petri dishes which had been dusted with S.P.N. at concentrations from 1 part S.P.N. in 200 parts of talcum powder, to 1 part in 2,000. The powder was distributed evenly giving a deposit of 0·5 mgm. per sq. cm.: 100 per cent. mortality was obtained after 48 hours at a concentration of 1 part in 2,000.

(2) Specimens of *T. infestans* were placed in wire mesh cages with wooden floors, which had been sprayed with emulsions of S.P.N. in water at concentrations from 1 part in 2,000 to 1 part in 10,000, giving a deposit of 0·01 cc. per sq. cm. At a concentration of 1 part in 2,000 toxic symptoms were immediately obvious, but the insects remained immobile for several days before death occurred.

The elimination of *T. infestans* from houses has been a considerable problem. The authors advise the use of 0·25 per cent. S.P.N. in powder for use in habitations, and show that at this concentration the risk of toxicity to man is exceedingly small.

[It is added in a footnote that in the United States a product having the same chemical formula as " Sulphos " is called " Thiophos "; but the authors suggest that the higher toxicity of the latter, according to published data, seems to indicate that the two products are not absolutely identical.]

C. M. Harrison

Wilde, J. K. H. **Experimental Use of Dimidium Bromide (1553) in the Treatment of *T. congolense* Infection in Zebu Cattle.** *J. Comp. Path. & Therap.* 1949, Jan., v. 59, No. 1, 48–53.

LEISHMANIASIS

KIRK, R. **Studies in Leishmaniasis in the Anglo-Egyptian Sudan. X. An Interesting Strain of** *Leishmania*. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, Mar., v. 42, No. 5, 501–2.

In a previous paper [this *Bulletin*, 1945, v. 42, 875], the author described a case of leishmaniasis in a monkey (*Cercopithecus aethiops*) infected intraperitoneally with the Sudanese kala azar which had previously been passaged from man through two other monkeys. The monkey showed symptoms of visceral leishmaniasis combined with cutaneous and mucocutaneous lesions. In order to follow this curious condition further, four monkeys of the same species were inoculated with material from the first monkey as follows : two intraperitoneally with splenic pulp and two subcutaneously with material from the oro-nasal lesion. All the material contained numerous leishmanias. Observations in the course of four years after inoculation of the infected material revealed no symptoms of disease in any of the four monkeys, and on post-mortem examination there was no evidence of a leishmanial infection. The author concludes that the strain of leishmania lost its virulence for monkeys in the course of passages through these animals, when it went through a stage producing metastatic cutaneous and mucocutaneous lesions. *C. A. Hoare*

GUPTA, D. M. & CHATTERJEE, J. R. **Kala Azar with Purpura, a Case Report.** *Calcutta Med. J.* 1949, Jan., v. 46, No. 1, 24–6.

HO, E. A., SOONG, Tsung-hsin & LI, Y. **Rate of Disappearance of** *Leishmania* **in Kala-Azar Patients under Urea Stibamine Therapy.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, May, v. 42, No. 6, 573–80, 1 graph.

In the past the evaluation of drugs for treating kala azar has been chiefly based on clinical impression. The authors have carried out this study in order to establish antimony therapy on a more rational basis, and in particular to determine the relation between the degree of infection before treatment and the rate of disappearance of leishmania on the one hand and the frequency with which the drug is administered on the other.

Of a total of 793 patients suffering from kala azar in North-West China, 449 were given injections of urea stibamine once a week and 344 were given the same drug twice a week. The total dosage for each person was based on his weight and age : adults were given a total dose of 20 mgm. per kilo. bodyweight, children 30 mgm. and infants 40 mgm. This total dose was divided into six equal individual doses and given weekly or twice weekly.

The patients were placed in groups according to whether the sternal puncture showed : (1) no leishmania ; (2) less than one parasite ; (3) 1 to 9 parasites ; (4) 10 to 50 parasites ; or (5) more than 50 parasites, per 10 microscopic fields (magnification 450), and according to whether injections were given weekly or twice weekly.

Sternal puncture was repeated in each case just before the third and the fifth injections and one week after the sixth injection. The time of disappearance of the parasites was noted in the various groups.

It was observed that the fewer the parasites the sooner the sternal puncture became negative ; for example, on weekly injections after the fourth injection, 100, 94·6, 80, 58 and 54·2 per cent. of sternal punctures were negative in the five groups, respectively. It was also noted that in each group after a given number of injections a higher percentage of those having weekly injections

than of those having twice-weekly injections were negative ; for example, in group (2) after 2, 4 and 6 injections of urea stibamine the percentages showing negative sternal punctures were 78·6, 94·6 and 99·4 among those having the injections weekly and 42·1, 77·7 and 98·3 among those having them twice weekly. The blood picture also improved after a smaller number of injections when the injections were given at weekly intervals.

In a follow-up of patients over a period of three years (one year after the last patient was treated) 4·1 per cent. of the patients on twice-weekly injections and 1·3 per cent. on weekly injections relapsed. Another group of 526 patients who returned for examination were in normal health ; 353 had negative sternal punctures and 45 negative spleen punctures. *L. E. Napier*

DE ARRUDA, W., DA COSTA, F. C., NAHAS, S. & ROSENFELD, G. Leishmaniose visceral americana. Constatação do dois casos. [**Two New Cases of American Visceral Leishmaniasis.**] *Brasil-Medico.* 1949, Feb. 19 & 26, v. 63, Nos. 8/9, 64–5, 1 map.

The English summary appended to the paper is as follows :—

" Two new cases of American visceral leishmaniasis are presented. They were diagnosed by the finding of leishmanias in spleen material.

" With all the probability one of these patients had the disease in the Brazil-Bolivia Railway area, Bolivia, and the other is original from a new focus of the disease in Matto Grosso."

LEFROU, G. La leishmaniose cutanée au Soudan français. Fréquence de la forme sèche papulo-tuberculeuse. [**Cutaneous Leishmaniasis in the French Sudan. Prominence of the Dry Form.**] *Bull. Soc. Path. Exot.* 1948, v. 41, Nos. 9/10, 622–7.

Oriental sore was first reported from French West Africa in 1911, in the Niger Colony ; later, more cases were reported from there and from Chad, but none from the French Sudan to the West. This was surprising in view of the similarity of the nature of the country. However, in 1944, reports were received from a young doctor, Dr. Vergez, who had been familiar with the disease in Zinder, that the condition was relatively common in Timbuktu. Later, a case of the dry papular form in an official from Legou and another case of the ulcerating form were diagnosed by Dr. Kervran at Bamako. As a result of these observations a circular on the diagnosis of this disease was sent to all doctors in the French Sudan and, in 1945, 138 cases were reported and the diagnosis confirmed at Bamako. Cases undoubtedly also occur beyond the administrative frontiers of the Sudan.

The commonest was the classical ulcerative form which could be confused with craw-craw or ecthymatous ulceration, or, when it occurs in the legs, phagedaenic ulcer.

The form that calls for special mention is the dry form, to which the author gives the name papulo-tubercular. The lesions are large, round, rosy, raised papules covered by a scab which rapidly re-forms if scratched off : they show no tendency to ulceration and usually heal in a few months' time leaving a distinct scar.

Four species of *Phlebotomus*, *P. roubaudi*, var. *papatasi*, *P. minutus*, *P. clydei*, and *P. africanus* have been found. Sandflies of the *P. papatasi* group are widely scattered in the Sudan, but are difficult to catch ; it is apparently the only sandfly that is pathogenic to man [*pathogène pour l'homme*], and its distribution coincides with that of cutaneous leishmaniasis.

Tartar emetic was used in the treatment of cutaneous leishmaniasis, with satisfactory results. The dry form has been treated by dermal infiltration of

quinacrine [mepacrine] thrice weekly, with mediocre results ; the ulcerative form was treated with many different antiseptics and caustics also.

L. E. Napier

FEVERS OF THE TYPHUS GROUP

Fox, J. P. **The Relative Infectibility of Laboratory Animals and Chick Embryos with Rickettsiae of Murine or of Epidemic Typhus.** *Amer. J. Hyg.* 1949, May, v. 49, No. 3, 313–20, 1 fig. [14 refs.]

The author has investigated the possibility of obtaining animals more suitable than guineapigs for the isolation of typhus rickettsiae. The results obtained and the technical methods employed will be of great interest to workers on the typhus fevers.

The most important findings obtained when freshly isolated strains of rickettsiae were used are as follows :—(1) The cotton rat was slightly more susceptible than the guineapig to murine and epidemic strains of rickettsiae. (2) The mouse was as susceptible as the cotton rat to murine strains, but relatively insusceptible to epidemic strains. (3) The chick embryo was as susceptible as the cotton rat to murine strains, but usually less so to epidemic strains, though after repeated egg passages epidemic strains became equally infectious for rats and embryos. (4) The cotton rat was considered to be the animal of choice for the isolation of both epidemic and murine infection from material obtained in the field, though the mouse is equally suitable for murine strains. (5) Rickettsiae persisted for long periods in the brain and kidney of cotton rats infected with epidemic and murine typhus, yolk-sac cultures being obtainable from suspensions of these organs up to 60 days. This persistence suggests that the existence of infection in the rats may be capable of detection by serological examination before attempts are made to isolate rickettsiae.

The establishment of recently isolated strains by yolk-sac cultures was often difficult ; bacteriological contamination caused failure in 52 out of 245 passage series, and in most cases two or even three successive passages were needed before positive results were obtained.

John W. D. Megaw

Snyder, J. C., Murray, E. S., Yeomans, A., Zarafonetis, C. J. D. & Wheeler, C. M. **The Effect of Typhus Vaccine on the Numbers of Rickettsiae in Body Lice of Typhus Patients.** *Amer. J. Hyg.* 1949, May, v. 49, No. 3, 340–45, 1 fig. [14 refs.]

The material employed in this important study consisted of pooled suspensions each made from 200 lice which had been allowed to feed for ten days on a typhus patient in a Cairo hospital. The suspensions had been rapidly frozen and stored in sealed glass ampoules which were kept in an alcohol-dry-ice cabinet till they reached the laboratory in the U.S.A. where they were rapidly thawed and diluted with sterile fresh milk so as to make suspensions containing material from 10 lice in each cc.

After the suspensions had been subjected to the usual laboratory tests a series of 10-fold dilutions were prepared in sterile skim milk, and 0·25 cc. of each dilution was inoculated intraperitoneally into each of four cotton rats. Six of the suspensions were of lice which had fed on typhus patients who had been vaccinated against the disease and 10 were from non-vaccinated patients.

Each of the inoculated rats was challenged three weeks later with a dose of *Rickettsia prowazeki* 2–4 times the minimum needed to kill unprotected rats. The survival of a rat was regarded as showing that it had received at least one

viable rickettsia in the inoculum. A calculation based on the degree of dilution that protected half of the inoculated rats of each group showed that on the average there were 10 viable rickettsiae in each cc. of louse suspension prepared from lice fed on the six patients who had been vaccinated, whereas there were 2,300 in each cc. originating from ten patients who had not been protected.

This striking difference was regarded as justifying the speculation that vaccination of a community with a Cox-type vaccine, followed by one or more " booster " doses of the vaccine, would suffice to reduce sharply the development of an epidemic of typhus fever even if no measures of disinfestation were employed.

The authors' study was already in progress when their attention was drawn to the report by Wohlrab *et al.* which strongly supported the same view [see this *Bulletin*, 1944, v. 41, 741]. *John W. D. Megaw*

Weyer, F. Versuche zur Uebertragung von Rickettsien auf Mäuseflöhe. [**Experiments in the Transmission of Rickettsiae to the Mouse Flea.**] *Zent. f. Bakt.* Abt. I. Orig. 1949, v. 153, 115–21.

The author has found that the mouse flea (*Leptopsylla segmis*) readily becomes infected with *Rickettsia mooseri* and certain strains of *R. prowazeki* by feeding on infected mice, and by intrarectal inoculation with infective material.

The technique of intrarectal inoculation of fleas is more difficult than in the case of lice.

As already described by the author in connexion with experiments on other insects [this *Bulletin*, 1949, v. 46, 624] intracellular strains of rickettsiae, virulent for mice, have often become extracellular and non-virulent after transfer through the flea and further transfers through lice. This change in the characteristics of the organisms is regarded as being due either to a true mutation or to the coexistence of extracellular and intracellular strains in the original infection, one or other strain becoming dominant according to the prevailing environmental conditions.

Fleas as well as ticks were found susceptible to the rickettsia of Q fever and the author suggests that fleas may play a part in the transmission of the disease. *John W. D. Megaw*

Randolph, R. M., Ogden, L. J. & Eads, R. B. **Entomological Studies on Typhus in Lavaca County, Texas.** *Texas Reports on Biol. & Med.* 1948, v. 6, No. 4, 444–52, 2 figs.

This paper deals with the incidence of and the control, by DDT in pyrophyllite dust, of certain flea, louse and mite parasites of *Rattus rattus* in urban and rural areas of Lavaca County, Texas, during the period October 1945 to September 1946.

Throughout the year, approximately 20 live rats per month from an untreated town and 10 rats per month from each of two treated towns were examined for ectoparasites. The treatments, which consisted of dusting known and potential rat runs with 10 per cent. DDT in pyrophyllite at the rate of ½ lb. dust per small café or similar premises, ¼ lb. dust per residence and 2–8 lb. dust per warehouse, mill, etc., were made in November, February and July. A similar study carried out in rural areas involved twenty-four farms, six of which remained untreated while in eighteen the rat runs were dusted with 10 per cent. DDT in pyrophyllite at the rate of about 2 lb. of dust per farm. About three rats per farm were examined each month between April and September after [apparently] one application of the dust.

Both *Xenopsylla cheopis* and *Leptopsylla segnis* showed significant reductions in the treated towns, but only the *X. cheopis* index was lower on the treated farms. There was no clearly detectable effect of the DDT on *Echidnophaga gallinacea*, nor on the louse *Polyplax spinulosa*, nor on the mite *Liponyssus bacoti*.

The following additional ectoparasites are recorded from *Rattus rattus* :— *Pulex irritans*, *Ctenocephalides felis* and *Nosopsyllus fasciatus* ; and the mites *Echinolaelaps echidninus*, *Laelaps nuttalli*, *Eulaelaps stabularis*, *Dermanyssus gallinae* and *Atricholaelaps megaventralis*. *D. S. Bertram*

Fox, J. P. **The Antibody Response of Rabbits to Rickettsial Vaccines in Water-in-Oil Emulsion.** *Amer. J. Hyg.* 1949, May, v. 49, No. 3, 303–12, 2 figs. [31 refs.]

The incorporation of aqueous suspensions of various antigens in a water-in-oil emulsion has been found to enhance, and often to prolong, the antibody production resulting from the use of the antigens as vaccines.

Employing technical methods described in the paper the authors found that such vaccines, prepared from yolk-sac cultures of rickettsiae of epidemic and murine typhus and of Rocky Mountain spotted fever, caused great enhancement and prolongation of the complement-fixing and mouse-neutralizing antibody responses in the sera of vaccinated rabbits, as compared with the responses obtained with aqueous-suspension vaccines.

The emulsion type of vaccine did not enhance the responses when tested on eastern cotton rats, and an emulsion type of murine vaccine did not give rise to a higher antibody production in man than the usual vaccines, though the antibodies persisted longer.

Vaccines prepared in the same way from *R. orientalis* gave rise to only a moderate resistance in guineapigs to challenge infection, and to no constant resistance in mice and cotton rats. The author states that more satisfactory protection might possibly result if a better original antigen could be obtained. *John W. D. Megaw*

Fox, J. P., Rickard, E. R., van der Scheer, J. & Cox, H. R. **Antibody Response to Vaccination against Murine Typhus.** *Amer. J. Hyg.* 1949, May, v. 49, No. 3, 321–39, 1 fig. [41 refs.]

The authors state that there are no published results of the use in man of murine-typhus vaccines of the yolk-sac type.

In the present study several types of vaccine were employed ; all were derived from the same yolk-sac suspension. Each type was tested on groups of 19 to 25 persons, and altogether more than 400 persons were used in the tests.

Complement-fixation and rickettsia-agglutination tests were carried out before and after vaccination ; the latter were found more sensitive than the former.

A single dose containing an adequate amount of antigen in the aqueous state gave results only slightly inferior to those resulting from the same amount of antigen given in three divided doses at intervals of one week.

Concentration of the vaccine by the sulphate or methanol method reduced the volume of the inoculum without affecting its potency. The water-in-oil emulsion [see Fox above] did not give rise to as high antibody titres as did the aqueous vaccine, but the immunity persisted longer. Vaccines precipitated by alum and zinc gave inferior responses. The responses to booster doses of the vaccines were much the same irrespective of the method employed in the primary vaccination ; the responses were better 50 weeks after the primary vaccination than 22–28 weeks after. *John W. D. Megaw*

MEHTA, D. R. **Studies on Typhus in the Simla Hills. Part IX. On the Life-History of *Trombicula deliensis*, Walch, a Suspected Vector of Typhus in the Simla Hills.** *Indian J. Med. Res.* 1948, Apr., v. 36, No. 2, 159–71, 1 pl. [19 refs.]

A study of the life history of *Trombicula deliensis* was undertaken since it appeared probable that of five *Trombicula* species in the area [see this *Bulletin*, 1938, v. 35, 358] it was the vector of XK-type typhus at Kasauli and Sabathu in the Simla Hills.

An account is given of a laboratory method for rearing *T. deliensis* for transmission experiments.

Larvae were obtained from the ears of wild infested *Rattus rattus* and placed in glass bottles containing moist sterilized earth. The larvae left the detached ears in 5–6 hours although they would remain on a host normally for fifteen days at 24–27°C., while at 0°–13°C. they either dropped off sooner or remained attached for about two months. Engorged larvae moulted to nymphs in fifteen days, at 23°–25°C.

Nymphs kept on sterilized earth in small glass jars and provided with sliced potatoes, carrots, melons and sweet apples died within a month without feeding. Dried rat blood and rat faeces were also tried unsuccessfully. Successful development of the life cycle from the nymphal stage was achieved by releasing the nymphs in a glass cage (2 ft. × 1 ft. × 1 ft. 6 in.) in which a layer of sterilized moist earth 3 in. thick on the metal floor was planted with " small wild grass". In the summer, the earth was sprinkled daily with water. As a source of food for larvae, a rat (*Rattus rattus*) in a 7 in. × 4 in. wire cage was placed in the glass cage and fed on sterilized oats and carrots daily. Apparently, the nymphs and adults in this environment fed on " decaying matter " in the soil and remained in the soil at a depth of at least 2 in. Development of the nymph to the adult stage required about nine weeks.

Adults, kept under observation in glass bottles containing decaying matter, remained alive throughout the winter at room temperatures about 13°C. Overwintering may, therefore, occur in the adult stage. Adults laid eggs in the soil and, although eggs were not isolated for observation, the indications were that, at 25°C., a month is required for oviposition and the hatching of the eggs. Eggs are probably laid singly. Detailed morphological descriptions (but no figures) are given of the larva, nymph and the adult. The average larval length is about 374μ; the nymph and adult are about 400μ and up to 1 mm. respectively in length. The colour of these mites varies from light to deep orange, sometimes tinged with red. It is suggested that *T. deliensis* is a variant of *T. akamushi*.

D. S. Bertram

CROSS, H. F. & SNYDER, F. M. **Chigger Control. Washing and Aging Tests of a Selected Group of Compounds Effective as Clothing Treatments against Chiggers.** *Soap.* New York. 1949, Feb., v. 25, No. 2, 135–43.

This paper is a more detailed account of a paper by the same authors, already abstracted [see this *Bulletin*, 1949, v. 46, 540].

VALERO, A. **Rocky Mountain Spotted Fever in Palestine.** *Harefuah.* Jerusalem. 1949, May 1, v. 36, No. 9. [In Hebrew 99–101. English summary 101.]

The English summary appended to the paper is as follows :—

" An account is given of the occurrence in Palestine of a Rickettsial spotted fever similar in its clinical aspects to Rocky Mountain Spotted Fever of the U.S.A.

" All the ten recorded cases seen during the Summer months of 1946–7 were amongst Jews who came from the Suburban area of the Haifa Bay, and most of them gave a history of an intimate association with dogs. Four out of the six dogs concerned gave positive agglutinations with OX_2 & OX_{19} in titres higher than 1 : 100.

" A comparative clinical study of the features differentiating this illness from the commoner Murine typhus in Palestine is summarised below in a tabular form.

	Murine typhus	The described form (R.M.S.F.)
Origin of patients ...	Jews and Arabs alike from all parts of Palestine	Only Jews from Haifa Bay
Course and end results ...	Light and moderately severe	Very severe
	No fatal cases	Death rate about 20 per cent.
The rash	Distribution : Centrifugal mainly on trunk. Later to a lesser degree also on limbs but never on soles and palms.	Distribution : Centripetal, first appearing on limbs, later spreading to trunk and face. Soles, palms and mucous membranes of mouth also involved
	Character : Sparse, isol. spots, never haemorrhagic	Character : Crowded with a tendency to confluency. Usually haemorrhagic
Complications	V. rare	More usual, *e.g.*, pneumonia, nephritis, (one case died of uraemia), cutan. gangrene (one case with extensive scrotal gangrene). Venous thrombosis. (One case died of pulm. embol.)
Weil-Felix	OX19++++	OX19+OX2++++ (1 : 320 and higher)

" We have no proof that the Rickettsia concerned is the Dermacentroxenus rickettsi. Further investigations into the matter are urged."

Collins, D. L., Nardy, R. V. & Glasgow, R. D. **Some Host Relationships of Long Island Ticks.** *J. Econom. Entom.* 1949, Feb., v. 42, No. 1, 110–12.

——, —— & ——. **Further Notes on the Host Relationships of Ticks on Long Island.** *Ibid.* 159–60.

The chief vector of Rocky Mountain Spotted Fever in man in the Eastern United States, including Long Island, is *Dermacentor variabilis*, other ticks rarely, if ever, biting man. The present papers report on ticks collected from mammals and birds on Long Island during 1946, 1947 and 1948 ; the survey was made to investigate the possible tick vectors of the rickettsial infection among animals.

The following ticks were obtained : *Dermacentor variabilis*, *Haemaphysalis leporis-palustris*, *Ixodes cookei*, *I. dentatus*, *I. muris*, *I. scapularis* and *I. marxi*.

A list of the hosts for each tick includes mice of the genera *Peromyscus*, *Microtus* and *Zapus*, skunk, opossum, rabbit, shrew, grey squirrel, *Rattus norvegicus*, red fox, cottontail, weasel, deer and chipmunk. The flying squirrel (*Glaucomys volans*) and the muskrat were not found to be infested with ticks. Birds (the brown-thrasher, cuckoo, catbird, song-sparrow, towhee and American thrasher) were parasitized only by *I. muris* and a few *H. leporis-palustris*. Some twenty other species of bird were found free of ticks.

Only *D. variabilis*, *I. dentatus* and *I. scapularis* were taken on man.

No adult ticks were found on birds and few on the mice, but many of the larger mammals carried both immature and adult ticks.

D. variabilis was the predominant species on the red fox (*Vulpes fulva*) and the racoon (*Procyon lotor*) ; it was the principal tick occurring as adults on the fox ; its immature stages were found mainly on *Peromyscus leucopus* and *Microtus pennsylvanicus*. Instances are given of these ticks being numerous on grass around horse manure and a sheep's skull, on the door of a pumphouse, and on the timber and grass of a boat slip in vicinities where it was otherwise not abundant. A larva with its rostrum inserted into a nymph engorging on *Peromyscus* is recorded.

Dragging a sheet across the ground yielded large catches of *D. variabilis* and a few specimens of *I. scapularis*, but all other species of tick were obtained only from their hosts. Although, therefore, *D. variabilis* would appear to be the most prevalent tick species when collections are made in this way, *I. muris* proved to be the predominant tick on many of the small mammals and the birds.

In 1948, *D. variabilis* occurred in highest density on the red fox in May and June (35·8 and 23·0 adult ticks per host) while the infestation peak for *I. scapularis* on the fox was in April. Regional differences in the abundance of some of the tick species are discussed. *D. S. Bertram*

Blanc, G. & Bruneau, J. Un réservoir de virus de la Q. fever en Algérie, la tique bovine " Hyalomma mauritanicum." [**Natural Infection of the Bovine Tick, *Hyalomma mauritanicum*, with the Rickettsia of Q Fever.**] *Bull. Acad. Nat. Méd.* 1949, v. 133, Nos. 5/6, 115–17, 5 charts.

Using a pooled suspension of 17 of the common bovine ticks, *Hyalomma mauritanicum*, for the subcutaneous inoculation into the loin of guineapigs the author isolated a strain of *Rickettsia burneti*.

The ticks were collected at Maison Carrée in Algeria.

The two guineapigs originally inoculated gave unusual reactions ; there was slight fever within the first 24 hours accompanied by a hard haemorrhagic oedema and local lymphangitis at the site of the inoculation ; there was only slight enlargement of the spleen. In guineapigs inoculated with spleen substance taken on the 6th day from the primarily inoculated guineapigs there was a delayed febrile reaction and the animals became immune to an Algerian strain of Q fever rickettsiae. On further passages the reactions became typical and numerous rickettsiae were found in smears from the local lesion.

The authors express a preference for subcutaneous inoculation despite the need for further passages before rickettsiae can be detected in smears.

John W. D. Megaw

Perrin, T. L. **Histopathologic Observations in a Fatal Case of Q Fever.** *Arch. Pathology*. 1949, Apr., v. 47, No. 4, 361–5, 3 figs.

" Only six fatal cases of Q fever are on record " [but see this *Bulletin*, 1949, v. 46, 351, in which reference is made to seven deaths, mostly in old persons].

Autopsies are reported to have been carried out on four of the cases, but in these, as in the present case, lesions not connected with Q fever probably exerted an unfavourable influence on the course of the disease.

In the present case, of a man aged 43, there was pronounced arteriosclerosis of the coronary artery and an old organized myocardial infarct. The lungs were in a state of bronchopneumonia with a predominantly mononuclear cell exudate and there was focal hypoplasia of the bone marrow ; these were the only lesions regarded as being due to Q fever. In the areas of gross consolidation of the lungs most of the cells in the exudate were large mononuclears ; there were a few neutrophile granulocytes and lymphocytes. In some patches there was a haemorrhagic exudate, and in many of the small isolated pneumonic areas neutrophile granulocytes predominated, but large mononuclears and lymphocytes also occurred in varying proportions. *John W. D. Megaw*

Huebner, R. J., Jellison, W. L., Beck, M. D. & Wilcox, F. P. **Q Fever Studies in Southern California. III. Effects of Pasteurization on Survival of** *C. burneti* **in Naturally Infected Milk.** *Pub. Health Rep.* Wash. 1949, Apr. 22, v. 64, No. 16, 499–511.

By an extensive series of carefully controlled experiments it was shown that milk infected with *Coxiella* [*Rickettsia*] *burneti* became free from infection when pasteurized by the " high-temperature, short-time " method in which a minimum temperature of 160°F. was maintained for 15 seconds.

With the " holding-vat " method in which a temperature of 143°F. was maintained for 30 minutes the milk was freed from infection in three out of four experiments ; in the case of failure it was found that three out of 20 guineapigs inoculated with the pasteurized milk gave positive complement-fixation reactions for Q fever.

Among 32 samples from bottles of vat-pasteurized milk on sale in the market it was found that three were presumably infected.

It is concluded that further work needs to be done to determine safe methods for eliminating the risk of infection by milk. *John W. D. Megaw*

YELLOW FEVER

Chwatt, L. J. *Aedes* (*Stegomyia*) *pseudoafricanus* **sp. nov. : a New Species of** *Aedes* **from the Coast of Nigeria (British West Africa).** *Nature.* 1949, May 21, 808–9.

Of interest in relation to the precise identification of mosquitoes related to the yellow fever problem.

Smithburn, K. C., Haddow, A. J. & Lumsden, W. H. R. **An Outbreak of Sylvan Yellow Fever in Uganda with** *Aëdes* (*Stegomyia*) *africanus* **Theobald as Principal Vector and Insect Host of the Virus.** *Ann. Trop. Med. & Parasit.* 1949, Apr., v. 43, No. 1, 74–89, 1 map. [17 refs.]

In previous papers [this *Bulletin*, 1947, v. 44, 992] Smithburn and his colleagues described the results of investigations which indicated that yellow fever is endemic among monkeys in the Semliki Forest in Western Uganda and that *Aëdes africanus* Theobald, which was found to be harbouring the virus, was the probable insect vector. The optimum biting level of this mosquito is at some distance above ground in the main forest-canopy, and its period of maximum biting activity is at a time when human beings are not often in the forest. Immunity studies in the human population showed a high rate of

infection among young children, who rarely enter the forest. The known vector of the disease among the human population in this area is *Aëdes simpsoni*, which occasionally enters the canopy of the forest edge.

In order to obtain further information on the mechanism of infection from animal to animal and to man, susceptible rhesus monkeys were exposed on platforms in the forest canopy. In a previous paper [see this *Bulletin*, 1949, v. 46, 457] the author and his colleagues described the infection of such a monkey at Zika, near Entebbe in 1947. From May to October, 1948, infection with yellow fever occurred in monkeys in 4 of 9 stations in one area of the forest covering several square miles. No infections occurred in the same period among monkeys at 20 other sentinal posts in the Semliki Forest.

During the period July to October, *Aëdes africanus* caught in the forest canopy were found to harbour virus, and when some lots were allowed to feed on normal monkeys, the latter became infected with yellow fever virus.

The monkey which received an injection of 133 *Phlebotomus* of various species caught in the first week of July in the same area, developed yellow fever at least 34 days later. The injection of suspensions of 4,234 other mosquitoes and 1,024 insects other than *Phlebotomus* spp. into a total of 10 non-immune monkeys gave rise to no infection.

F. O. MacCallum

RABIES

Novicky, R. **Contribution to the Study of Bovine Paralytic Rabies in Venezuela.** *Canadian J. Comp. Med.* 1947, Nov., v. 11, No. 11, 335–7.

First described in Brazil in 1911, paralytic rabies of cattle is a communicable disease, which today affects most countries in South America and which, as established between 1931 and 1936, is transmitted by blood-sucking bats. As a result of heavy losses among cattle in 1938, the Government of Venezuela began taking energetic measures to control the spread of the infection. Among these measures the principal was the vaccination of cattle in the areas involved. Inasmuch as the causal agent of the condition was found to possess certain biological and immunological characteristics which the virus of canine rabies lacked, two strains of the local paralytic virus were chosen for the production of vaccine and, after fixation, used in calves from 6 to 9 months old to ensure adequate supplies. The strains employed were: (1) the Bolivar virus, originating in the southern parts of Venezuela, from the State of Bolivar, and (2) the Maturin virus, deriving from the area where paralytic rabies of cattle was originally diagnosed in the country in 1938. The incubation period of the former strain became fixed for calves at 5 days on and after the 52nd passage, that of the latter at 6 days on and after the 14th passage. Both viruses in a dilution of 1 in 5,000 are lethal for the calf.

The finished vaccine is a 15 per cent. emulsion of brain and spinal cord, the virus being inactivated by exposure to the action of phenol and heat at 37°C. As assessed by the Habel mouse test, the antigenic potency is invariably higher than that required for a standard anti-rabies vaccine in the U.S.A. Moreover the vaccine has been shown to confer on mice better protection against the Bolivar virus than one containing Pasteur fixed virus.

In combating paralytic rabies in Venezuela the vaccine has given very satisfactory results. The disease is now under control and has ceased to be a veterinary problem because of the preventive vaccination of all susceptible animals.

G. Stuart

Jonnesco, D. Recherches sur la maladie d'Aujeszky. [**Investigations on Aujeszky's Disease.**] *Arch. Roumaines Path. Expér. et Microbiol.* 1948, v. 15, Nos. 1/2, 122–34, 1 fig. [20 refs.]

The English summary appended to the paper is as follows :—

" A new virus ' Aujeszky ' was identified from a cat, with incubation period of 2 days in rabbit and guineapig. By rubbing the shaved skin of young dogs especially, vesicles appear which very rapidly change into pustules and finally are covered by crusts. These vesicles are produced with this virus and another virus Aujeszky Nr. 1, identified by the author in 1934.

" The production of these vesicles creates immunity in dogs, immunity ascertained by the virulicidal action of blood serum (1/5) and by resistance to new infection.

" There does not exist a cross immunity between Aujeszky's disease and rabies.

" Acquired immunity in dogs, due to friction or scarification of skin with formation of vesicles, obliges us to consider the Aujeszky virus close to the herpetic virus and to add to the known neuro-organotrope characters of the virus, a new dermatrope character."

PLAGUE

Rockenmacher, M. **Relationship of Catalase Activity to Virulence in** *Pasteurella pestis*. *Proc. Soc. Exper. Biol. & Med.* 1949, May, v. 71, No. 1, 99–101.

" 1. Optimal conditions for catalase activity in *P. pestis* were determined and the catalase activity of 14 virulent and 11 avirulent strains was measured.

" 2. The catalase activity of virulent strains was significantly greater than that of the avirulent strains.

" 3. The possibility of using catalase activity as a screening test for determining virulence *in vitro* has been indicated."

Davis, D. E. & Fales, W. T. **The Distribution of Rats in Baltimore, Maryland.** *Amer. J. Hyg.* 1949, May, v. 49, No. 3, 247–54, 4 figs.

The survey described in this paper deals only with the census of brown rats (*Rattus norvegicus*) in Baltimore. The roof rats (*R. rattus*) were far less common. The basis on which the number of rats was estimated is stated as " an evaluation of the signs of rats in yards and houses and calibration with the number of rats trapped." It is assumed that this method has an error of about 10 to 20 per cent. In the actual census a " trained observer examined the block for signs of rats, such as holes, droppings, runways. Since in most cases these signs are located along the alley or can be seen easily from the alley, it was possible, therefore, merely to go along the alley to make the estimate. The construction in some blocks was such that as good an estimate could be obtained from a car as by walking ; in these cases the trained observer drove slowly along the alley."

In September, 1947, a random sample of 359 blocks was surveyed in the residential part of Baltimore and it was estimated that the total number of rats was between 119,000 and 158,000. On the basis of other sources of information it was estimated that there were about 26,000 rats in the commercial areas of the city. The number of rats in each residential section varied directly with the number of houses needing major repairs.

The wide range of variation in the rat population is shown by the estimate that in 156 blocks no rats were detected ; in 181 blocks there were 5 to 75 rats and in 22 blocks there were 100 to 200.

The average number of rats in each dwelling unit was 0·588 ; the range in the different census tracts being 0·021 to 1·405.

In a previous estimate made in 1944 by a different method, the total number of rats was believed to be about 420,000, so that although the figures are not strictly comparable there must have been a considerable decrease since that time ; this is attributed to extensive rat-proofing, poisoning, and better disposal of garbage and refuse.

The present human population of Baltimore is not stated, but it appears to be about one million because it is mentioned that even if there were 200,000 rats in the city this would mean at most one rat per five persons.

John W. D. Megaw

Macchiavello, A. Evaluación de nuevas drogas para el tratamiento y prevención de la peste, especialmente bubónica. [**Evaluation of New Drugs for the Treatment and Prevention of Plague, specially Bubonic.**] *Bol. Oficina Sanitaria Panamericana.* 1949, Apr., v. 28, No. 4, 328–55. [Numerous refs.] English summary.

A comprehensive review.

CHOLERA

Gauld, R. L., Schlingman, A. S., Jackson, Elizabeth B., Manning, Mary C., Batson, H. C. & Campbell, Charlotte C. **Chloramphenicol (Chloromycetin) in Experimental Cholera Infections.** *J. Bacteriology.* 1949, Mar., v. 57, No. 3, 349–52.

The results are submitted together of studies on the action of chloramphenicol (Chloromycetin) on experimental cholera infections, which were carried out at the Army Medical Department Research and Graduate School, Washington, D.C. and at the Research Laboratories of Parke Davis & Co., Detroit, Michigan.

In vitro tests showed the drug to inhibit completely the growth of Inaba and Ogawa strains of *V. cholerae* in a concentration of 0·005 mgm./ml. of single strength brain heart infusion broth at *p*H 7·6 : 50 per cent. inhibition, as determined by turbidimetric assay, was obtained with 0·00025 mgm./ml.

White mice were used for tests in which the drug was administered at various periods before and after an intraperitoneal challenging dose of a suspension of a culture in 5 per cent. hog gastric mucin. Several levels of dosage were employed. At Washington, in one series of tests in which the drug was given subcutaneously at periods from 1 hour preceding the challenging dose to 2 hours after, there were only 2 deaths in 90 mice compared with 50 deaths in 60 untreated controls. Administration 6 hours after was not effective. At Detroit, tests were carried out with chloramphenicol and sulphadiazine administered by stomach cannula at 2 and 6 hours after infection. Of those given chloramphenicol only 3 out of 120 died. In the sulphadiazine series, 25 out of 60 died and in the control, untreated, series 22 out of 30.

A single dose of chloramphenicol at 2 hours after infection was also found effective, only 3 out of 178 mice dying after dosage of 0·5 to 2·0 mgm., as against 17 out of 30 controls. Sulphadiazine had a considerable but lesser value.

A single dose of chloramphenicol 4 hours after infection had little beneficial effect.

In discussing the findings in relation to their application to the treatment of human cases of cholera the authors remark that " No chemotherapeutic drug could be expected to be effective in this disease in man once dehydration had occurred unless it was augmented by measures designed to restore water, salt and protein balance. In the experiments in Detroit, chloromycetin was effective when given directly into the stomach of the mice. However, the vomiting in human cholera might well exclude the administration of the drug *per os* and it would probably be necessary to give it parenterally. Because of the extremely rapid development of this disease in man chloromycetin treatment would have to be instituted early. Indeed it is possible that if this drug proves to be of any value in the human disease its principal use may be as a prophylactic agent in the face of an epidemic."

[This recognition of factors which may affect the chemotherapy of cholera is timely. The same considerations are likely to apply in the case of other drugs that may be tried. A clinical trial to determine the actual field of usefulness of the drug, is however, desirable.] *J. Taylor*

Shrivastava, D. L., Singh, G. & Ahuja, M. L. **Immuno-Chemical Studies of *Vibrio cholerae*. A Preliminary Note.** *Indian J. Med. Res.* 1948, Oct., v. 36, No. 4, 409–13. [14 refs.]

Protection experiments against intraperitoneal infection of mice with *V. cholerae* were carried out with polysaccharides extracted from the organism by three different methods. The methods of extraction used were : (1) White's method [this *Bulletin*, 1936, v. 33, 861] in which the growth on agar is digested with papain at 60°C. and the protein subsequently removed by treatment with saturated picric acid solution ; (2) Shrivastava and Seal's method [*ibid.*, 1937, v. 34, 784] of treatment of the concentrate from broth, and removal of the protein by shaking with chloroform and butyl or amyl alcohol, and (3) the phenol method (Palmer and Gerlough, *Science*, 1940, Aug. 16, 155) in which the acetone dried growth is treated with 90 per cent. phenol.

White mice were immunized with two doses of 0·2 cc. of a saline solution of the particular polysaccharide given at intervals of one week and a challenging measured dose of a six-hour culture of a selected strain of *V. cholerae* was given in 5 per cent. mucin one week later. The total immunizing dose employed in different tests varied from 0·059 to 0·300 mgm. of the polysaccharide.

The best results were obtained with the extract prepared by the phenol method, of which the details are given in the paper : the immunized animals were able to withstand a test infection of at least 200 lethal (L50) challenge doses. The results compared favourably with those obtained in controls given the ordinary type of cholera vaccine [the reference to White is incorrectly shown as p. 157, instead of p. 229]. *J. Taylor*

Bose, H. N. & Chakraborty, D. C. **Bactericidal Action of Metallic Copper on *Vibrio cholerae*.** *Ann. Biochem & Exper. Med. Calcutta*, 1948, v. 8, Nos. 3/4, 83–8.

The action of metallic copper on *Vibrio cholerae* was tested by placing strips of copper foil in suspensions of the organism in water and subsequently sub-culturing at intervals of half an hour. In distilled water, the vibrio could not be recovered later than ½-hour in the presence of copper, while it survived for 48 hours in controls. In filtered tank water with a nitrogen content of 0·4 mgm. per 100 cc. it could not be recovered later than 1½ hours but survived for 15 days in the absence of copper. Other intestinal organisms survived for longer periods.

When the copper foil was allowed a period of 2 hours' contact with water and was then removed before the addition of the vibrio suspension, the organism could not be recovered later than 30 minutes. When contact had been for 4 hours, survival was for 15 minutes only. Other tests showed that the surface area of the copper foil in relation to the volume of water appeared to affect the rapidity of death of the vibrio. A higher nitrogen content of the water lengthened its survival.

When peptone water or Douglas broth were prepared with distilled water kept in contact with copper foil for 48 hours, no lethal effect on *V. cholerae* was shown, the organism still being recovered after 15 days.

Tests carried out in highly polished copper vessels instead of by addition of copper foil also showed lethal effect on the vibrio which could not be recovered from filtered tank water later than 1½ hours. The periods for other intestinal organisms were longer. In these experiments chemical tests for copper were negative.

It is suggested that water should be stored in clean copper vessels for 4 to 6 hours during periods of epidemic cholera. *J. Taylor*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

Viersma, H. J. & Kian, L. P. Enkele gevallen van amoebiasis. [**Some Cases of Amoebiasis.**] *Nederl. Tijdschr. v. Geneesk.* 1949, June 25, v. 93 (ii), No. 26, 2143–52. [Refs. in footnotes.]

The English summary appended to the paper is as follows :—

" Four cases of amebiasis, two of which autochthonous, are described. One of the patients had a colon carcinoma as well, whilst one of the others had a liver abscess when admitted. In two cases the nature of the disease had been misjudged for years.

" Amebic dysentery in the Netherlands is usually of tropical origin, directly or indirectly. Therefore, the repatriation of tens of thousands of civilians after the war and the return of our troops from Indonesia are expected to give rise to an increase in amebiasis. In this connection the importance of faeces examination is stressed. The significance of Kuenen and Swellengrebel's view on the commensal phase of E. dysenteriae (minuta forms) is explained, as well as the necessity of completing the emetine treatment with a course of yatren (chiniofon or anayodin)."

Reardon, Lucy V. & Bartgis, Ida L. **The Cultivation of the Small Race of *Endamoeba histolytica* with a Single Species of Bacteria.** [Research Notes.] *J. Parasitology.* 1949, Apr., v. 35, No. 2, 218–19.

Ten tubes of Locke-egg medium, containing rice-starch and bacteria (" organism *t* ") were seeded with 10 cysts each of a small race of *Entamoeba histolytica*, isolated by micro-manipulation from the stool of a girl with a symptomless infection. Seven of the 10 tubes became positive, and one of these has been maintained for a year in sub-cultures. The original infection and the cultures were proved to belong to the small race of the organism ; cysts measured 7·3μ, and the trophozoites of the cultures 7·6μ.

An interesting effect of the amoebae upon the rice grains was noticed. The particles are ordinarily enveloped in gluten, and few discrete grains are visible ; when growth of the amoebae begins, much of the gluten disappears and a

profusion of discrete granules is left. This phenomenon is thought to be the result of the action of an enzyme derived from the amoebae which liberates the starch grains from their gluten envelope [see also this *Bulletin*, 1948, v. 45, 517, 787]. *P. C. C. Garnham*

GRIFFIN, A. M. & MCCARTEN, W. G. **Some Methods for the Quantitative Study of Entozoic Amoebae in Cultures.** *J. Parasitology.* 1949, Apr., v. 35, No. 2, 193–8.

A method has been devised to facilitate the counting of amoebae in cultures. Counts are performed in a cerebrospinal fluid counting chamber 0·2 mm. deep with the Fuchs-Rosenthal ruling. The amoebae are grown in liver-serum-broth (10 cc.) with purified rice starch (25 mgm.). This rice is prepared very carefully in order to get rid of extraneous material; it consists of individual grains and suspends uniformly. The medium is inoculated with the amoebae, incubated and after an optimum period 20 mgm. more of starch are added, followed by further incubation for 1 hour to permit the amoebae to gorge themselves. The sediment is suspended by "snapping" the tube or by aspiration with a pipette, 1 cc. of 10 per cent. formalin is added and the mixture is heated for 10 minutes at 70°C. The amoebae are again suspended and a sample is taken for a count. It may be necessary to centrifuge the fluid, if the culture is too sparse.

Experiments showed that this treatment with formalin followed by heat was the only satisfactory method to render the starch invisible and thus permit of easy counting of the organisms. These treated cultures could be stored and counted at any convenient time later. The manipulations result in the loss of some of the amoebae, amounting in some instances to 25 per cent. but the relative counts are said to remain constant. *P. C. C. Garnham*

BEAVER, P. C. & DESCHAMPS, G. **The Viability of *E. histolytica* Cysts in Soil.** *Amer. J. Trop. Med.* 1949, Mar., v. 29, No. 2, 189–91.

It is generally held that pollution of the soil with human faeces containing cysts of *Entamoeba histolytica* is one of the sources of amoebic infection. However, no observations have been made on the survival of the cysts in the soil. In the present paper the authors record experiments on the viability of these cysts, carried out in Venezuela.

Cysts, obtained from stools of carriers, were washed by repeated centrifugation in distilled water, after which the sediment was rinsed on to samples of damp soil kept in glass cylinders (15 × 15 cm.) and worked to the depth of 10–15 mm. from the surface. As a control, cysts concentrated by zinc sulphate flotation were washed and kept in 125 cc. flasks with well aerated distilled water. At intervals of 2 days samples of the soil were suspended in distilled water, strained through gauze, concentrated by flotation, rewashed and inoculated in BALAMUTH and SANDZA's culture medium, [this *Bulletin*, 1945, v. 42, 999], to test for the presence of viable cysts. At the same time cultures were made of the control cysts. The cultures were examined 24 and 28 hours after inoculation; those found negative on first examination were subinoculated in fresh medium and re-examined.

Five preliminary tests showed that cysts of *E. histolytica* could be recovered from the soil by zinc sulphate flotation, that they remained viable in the soil at least 2 days, and that free-living amoebae will not grow in this culture medium at 37·5°C. In three other tests the results were negative, but cultures of the cysts made directly from the stools indicated that the cysts were already not viable, when deposited in the soil. It was also evident that some types of

soil used and a high external temperature (28–34°C.) did not favour the survival of the cysts. The soil used most successfully was dark loam containing some 30–50 per cent. of fine sand. The best results were obtained in three experiments in which cultures of *E. histolytica* with abundant growth were positive after 2, 4, 6 and 8 days. On the other hand, in the control tests with aerated water growth in cultures occurred only after 2–4 days. It was thus shown that under certain conditions cysts of *E. histolytica* can survive in soil up to 8 days, whereas in clean aerated water their viability does not exceed 4 days.

C. A. Hoare

Beaver, P. C. & Deschamps, G. **The Effect of Acetic Acid on the Viability of *Endamoeba histolytica* Cysts.** *Amer. J. Trop. Med.* 1949, Mar., v. 29, No. 2, 193–7. [10 refs.]

In view of the danger of amoebic infection arising from consumption of uncooked foods, especially vegetables, the authors set themselves to find a prophylactic chemical which, while lethal to *Entamoeba histolytica* cysts after short exposure, would be non-deleterious to health, and would not adversely affect the appearance and flavour of the food. They have produced experimental evidence indicating that acetic acid in concentrations used in vinegar (about 5 per cent.) fulfils these requirements.

The tests, conducted in Talara, Peru, were carried out as follows. Specimens of stools from known carriers of *E. histolytica*, containing numerous cysts, were washed repeatedly by centrifugation in distilled water, after which the washed sediment was placed in test-tubes (about 0·02 cc. in each). Various concentrations of the acid were added so as almost to fill the tube, and the contents were mixed by rotation and shaking. At the end of the test period the tubes were centrifuged, the acid was poured off, and the sediment was washed repeatedly. Viability of the cysts after treatment was determined by adding to the sediment Balamuth and Sandza's all-liquid culture medium [this *Bulletin*, 1945, v. 42, 999]. Cultures were examined after incubation for 36–48 hours, and were reported as negative if no amoebae could be found after systematic search of one drop of the sediment. All negative cultures were subinoculated in fresh media. Untreated washed cysts served as controls.

The results of the tests were as follows. A 10 per cent. solution of acetic acid killed the cysts in less than 5 minutes ; however, this concentration cannot be used for vegetables because it wilts them rapidly and because vinegars containing this concentration are unpalatable ; a 2·5 per cent. solution killed the cysts after treatment for 45 minutes, but the time required was too long to be practicable ; finally, a 5 per cent. solution was lethal to the cysts in 10–15 minutes, and this concentration would seem to be the most suitable for the treatment of vegetables. Except for radishes, there was no change of colour in the vegetables, while a change in the flavour of some vegetables did not differ from that acquired by them in salads.

Similar tests made with two local varieties of vinegar, one containing 2 per cent., the other about 6 per cent. acetic acid, were inconclusive. Other tests showed that 20 per cent. citric acid and N/2 hydrochloric acid had no deleterious effects on the cysts.

It is concluded that since 15 minutes' contact with 5 per cent. acetic acid kills not only the cysts of *E. histolytica* but also certain pathogenic bacteria (*e.g.*, food poisoning staphylococci, *Salmonella typhi*, *Salm. aertrycke*, *Bact. coli*) it would appear to be suitable for chemical treatment of food.

C. A. Hoare

STEWART, G. T. **Nature of the Action of Emetine upon** *Entamoeba histolytica.* [Correspondence.] *Nature.* 1949, May 28, 842, 1 chart.

The author investigated the action of emetine hydrochloride on *Entamoeba histolytica in vitro*, (*a*) in cultures in horse serum and rice starch, and (*b*) in suspensions prepared from such cultures. Ten strains were used and the amoebae were accompanied by different bacterial flora (*e.g.*, one strain was grown with *Bact. coli* and *Cl. welchii*). A dilution of above 10^{-7} of emetine had no effect on cultures ; dilutions below this sterilized cultures in 3 to 7 days, while a dilution of 10^{-4} completely inhibited multiplication of the organisms. The addition of cysteine did not reverse the action of the emetine. Similar dilutions were employed on the suspensions ; for the first four hours, the viability of the amoebae was unaffected (as shown by positive sub-cultures), but after this period, degeneration of the organisms began, and by 48 hours was complete.

The author concludes that emetine does not produce an immediate toxic effect upon *E. histolytica* but has an amoebostatic action proportional to its concentration. In fact, surviving amoebae removed after 48 hours from an emetine medium are able to grow normally. *P. C. C. Garnham*

i. ARMSTRONG, T. G., WILMOT, A. J. & ELSDON-DEW, R. **The Treatment of Amoebic Dysentery in the Bantu African.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, May, v. 42, No. 6, 597–604, 1 fig.

ii. ——, ELSDON-DEW, R. & MAROT, R. J. **Amoebiasis in the African. A Report on the Treatment of 600 Cases.** *South African Med. J.* 1949, May 14, v. 23, No. 20, 369–74, 4 figs. (1 coloured).

i. The substance of this paper, with some additional information and conclusions, is to be found in the paper reviewed below.

ii. Amoebic dysentery is a common and serious disease in male Africans ; there were 2,500 admissions for it to the King Edward VIII hospital, Durban, in one year. The response to the usual amoebicides was poor, so tests were made of the efficacy of various drugs alone, or in combination, in the treatment of the condition. The assessment of results was based on immediate repeated examinations of the stools and of scrapings obtained sigmoidoscopically. " Probable successes " comprised those in whom both ulceration and parasites disappeared after treatment ; " failures " included " absolute failures " in whom both persisted, and " possible failures " in whom ulcers persisted but amoebae could no longer be found. Follow-up over an adequate period was impracticable. Emetine and diodoquin, either being given alone, were found to produce " probable success " in only about 50 per cent. of cases, and " absolute failure " followed in 28 per cent. ; together concurrently " probable success " was obtained in over 70 per cent., and " absolute failure " occurred in only 2 per cent. E.B.I. produced results comparable to emetine ; carbarsone was markedly inferior to diodoquin in efficacy.

Combined penicillin and sulphasuxidine treatment either for a week before emetine and diodoquin treatment, or concurrently, produced a very high percentage of " probable successes " (over 90 per cent. of 105 cases) ; and sulphasuxidine only, with emetine and diodoquin, produced comparable results (88 per cent. in 49 cases). Penicillin (6 million units) and sulphasuxidine (600 tablets) for 21 days, without any of the recognized amoebicides, given to 11 cases resulted in " probable success " in 82 per cent., and no " absolute failures " ; the immediate effect was considered to be greater than that of emetine alone. The conclusion is reached that these " antibiotics " [penicillin and sulphasuxidine] are immediately effective in the treatment of amoebiasis.
A. R. D. Adams

ANGIONI, G. L'iodoformio nella cura dell'infezione amebica. [**Iodoform in the Treatment of Amoebiasis.**] *Acta Med. Italica.* 1949, Apr., v. 4, No. 4, 93–6. [12 refs.] English summary (5 lines).

Treatment of amoebiasis by iodoform was brought forward by CASTELLANI in 1935 [this *Bulletin*, 1936, v. 33, 546] and since then several have written extolling its value, alone or combined with emetine or alternating with emetine.

The author in this paper records the results of its use in 29 patients in different stages of the infection. The preparation used contained in each tablet 0·05 gm. of iodoform with vegetable charcoal 0·1 gm., Ext. of camomile 0·01 gm. and Ext. lactugae virosae (lettuce) 0·02 gm. with sugar and starch. The odour and taste of the iodoform are thus masked and the drug is well tolerated.

The patients, for purposes of description, were divided into three groups: (1) Nine who had had the infection for 15–20 months, had had other forms of treatment and were in a fair general state of health. These were given 30 cgm. (6 tablets) [presumably daily] for 12 consecutive days, then, after an interval of 5 days, a second course of 15 cgm. daily for 10 days. The amoebae were not seen in the faeces after 6–8 days' treatment, the general condition improved, abdominal pain diminished and stools were fewer. (2) Eleven in a "fair condition" generally, who had been ill for two years or more and had had various forms of treatment. These were given 30 cgm. daily for 8 days, then a course of emetine (50–70 cgm. in all) followed by 15 cgm. of iodoform daily for 10 days. With one exception, the faeces were all negative for amoebae and remained so for 2 months [later events not mentioned]. (3) Nine patients in bad general condition, with anaemia and myocardial complications and who had undergone treatment in various hospitals. These were given iodoform only, 10 cgm. daily for 20 days, with a week's rest [whether during the course or after a course and before undergoing further treatment is not stated]. One of these is thought to have been cured, 5 improved, one was unchanged, one had been transferred elsewhere [and presumably could not be followed up] and one died of broncho-pneumonia. None of the patients showed any signs of intolerance. *H. Harold Scott*

HAWORTH, R. D., MCKENNA, J. & SINGH, N. **Constitution of Conessine. Part I.** *J. Chem. Soc.* 1949, Apr., 831–8, 1 fig.

MORETTI, G. F. Hépatite amibienne et conessine. (A propos d'une auto-observation.) [**Auto-Observation regarding Amoebic Hepatitis and Conessine.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 3/4, 132–5.

The author himself suffered from an attack of amoebic hepatitis, for which he was treated with conessine hydrochloride 0·5 gm. daily to a total of 2·5 gm. By the third day the symptoms and signs of hepatitis had vanished. Another course of 2·20 gm. of the drug over five days was given a week after completion of the first. The toxic side-effects of treatment initially were sweats, giddiness, trembling, dryness of the mouth, and a bitter taste; during the second course these were less evident. Although chronic colitis persisted no amoebae or cysts were found in the stools after treatment.

RIOU, in discussion, reviewed the treatment of amoebiasis with the total alkaloids of *Holarrhena floribunda* and with the hydrochloride or the hydrobromide of conessine. He considered that the salts in the advocated high dosages produced side effects which precluded their general employment in ambulatory cases and in the field. The total akaloids, in smaller dosage, proved as therapeutically satisfactory, were better tolerated, and were therefore more suitable for ambulatory treatment. *A. R. D. Adams*

Prado, F., Jr. Ação dos extratos de Jacarandá decurrens, de nectandra pichury e de simaruba officinalis sôbre *Endamoeba histolytica*. [**The Action of Carobinase on** *Entamoeba histolytica*.] *Brasil-Medico*. 1949, Feb. 5 & 12, v. 63, Nos. 6/7, 43–5. [14 refs.] English summary.

Carobinha is one of the local names of *Jacaranda decurrens*, a tree of Brazil, growing to a height of 4½–6 feet, whose leaves contain a bitter principle with astringent action, an aromatic balsam like coumarin, an acid, carobic acid, a bitter resin and a crystallizable glucoside. An extract obtained from the leaves (and also from *Nectandra pichury* and *Simaruba officinalis*) is known as Carobinase. An aqueous extract and a tincture of the fresh leaves were used by Peckolt & Prado in protozoal infections [see this *Bulletin*, 1935, v. 32, 657]. [But the figures given in this paper and quoted from a thesis by Valdivieso in 1940 convey little useful information, since it is stated that "forty cases of dysentery were treated, with 86·5 per cent. cures in acute forms and 80 per cent. in the chronic forms" and that "magnificent results were obtained in 60 per cent. of Trichomonas infections and 62 per cent. of Giardia".]

The author has now tested, by way of preliminary to the use of carobinase in human cases of amoebic dysentery, dilutions of carobinase and their effect on cultures of *E. histolytica* at 37°C. at *p*H 7·2–7·5. It was found to be amoebicidal in a strength of 1 : 4,000 and inhibited, but did not kill, at 1 : 5,000. It acted better, *i.e.*, in higher dilution, in an alkalized medium than in an acid, and it is advised that, if tried in man, alkalies should be given at the same time. *H. Harold Scott*

Carini, A. & Reichenow, E. *Entamoeba caudata* **n. sp.** *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart, [1949], v. 1, No. 1, 102–5, 8 figs.

The authors describe a new intestinal amoeba recovered from the stool of a dog. The living parasite was observed in São Paulo, Brazil, by one of the authors, who supplied the other with preparations stained with iron haematoxylin, on which the present study is based.

When seen alive the amoeba was actively motile, its movements resembling those of *Entamoeba histolytica*. This motility was registered in the permanent preparations which show amoebae extended in length, with a finger-like pseudopodium, or rounded, with several blunt pseudopodia. The amoebae varied considerably in size, from 10 μ in diameter to 36 $\mu \times 16$ μ, the majority measuring from 20 to 26 μ.

The structure of the nucleus is typical of the genus *Entamoeba*, being vesicular, with a karyosome, which may be central or eccentric, and with coarse peripheral chromatin granules which are irregularly distributed on the nuclear membrane, usually in groups. The cytoplasm contains numerous ingested bacteria. The most characteristic feature of the new amoeba is the presence of a sac-like rounded protrusion situated at the end of the body opposite to the direction of locomotion, on account of which it is referred to as the "caudal appendage" (*Schwanzanhang*). This appendage, which appears to be a constant structure independent of the rest of the body, frequently contains masses of darkly staining granules representing bacteria in different stages of digestion. The authors regard this structure as a localized organ of digestion. Although blood and mucus were seen in the stool of the host, no cellular elements were present in the stained preparations. Cysts of this amoeba have not been seen. All the features described are shown in the text figures accompanying this paper. On account of the presence of a special "caudal" appendage with digestive functions, the amoeba in question is referred to a new species under the name

Entamoeba caudata. The only other amoebae in which there is a differentiated portion at one end of the body are the free living *Trichamoeba* and the avian parasite, *Pygolimax*. *C. A. Hoare*

GATTNER, H. Die Flagellateninfektion des Darms. [**Flagellate Infections of the Intestine.**] *Med. Klin.* 1949, Apr. 1, v. 44, No. 13, 400–404, 6 figs.

There are two schools of opinion regarding intestinal flagellate infection : one looks upon them as harmless commensals, the other as definitely pathogenic. The author belongs to the latter school. There is a third, or, perhaps we should say, an intermediate school which holds that some other lesion is primary and enables the protozoon, under normal conditions harmless, to become pathogenic. The author quotes cases in which a watery diarrhoea was the common symptom, with loss of weight and, in those of long standing, symptoms leading to a suspicion of pellagra or sprue. One case is referred to, of a man who suffered for a year from nocturnal enuresis and was found to have a *Trichomonas* infection ; when this was got rid of, the enuresis also cleared up. The parasites found were *Giardia intestinalis*, *Trichomonas intestinalis* and in one this last together with *Chilomastix mesnili*. Under appropriate treatment the symptoms disappeared. Atebrin [mepacrine] 0·1–0·2 gm. daily was given for *Giardia* infection ; for *Chilomastix* and *Trichomonas*, calomel *per os* and enemas of 5 per cent. argyrol were given. The author also gave emetine, 0·05 gm. subcutaneously daily, with success in *Giardia* and *Trichomonas* infections, and, for the latter stovarsol, methylene blue 0·1 gm. t.d.s. or gentian violet 0·1–0·5 gm. [In none of the cases recorded is anything said of re-examination of the faeces after treatment to prove whether, with the improved general condition and relief of symptoms, the parasites disappeared or not.] *H. Harold Scott*

HARRIS, R. H. & MITCHELL, J. H. **Chronic Urticaria due to Giardia lamblia.** *Arch. Dermat. & Syph.* 1949, May, v. 59, No. 5, 587–9, 1 fig.

"A case is presented of chronic urticaria of five months' duration with evidence of Giardia infestation which cleared after administration of quinacrine hydrochloride for a few days. A subsequent examination of the stool showed no evidence of Giardia lamblia. The accompanying symptoms of nausea, epigastric distress and alternate constipation and diarrhea ceased."

BYLMER, J. *Tricercomonas intestinalis* **in the Netherlands.** *Documenta Neerlandica et Indonesica de Morbis Tropicis*. Amsterdam. 1949, Mar., v. 1, No. 1, 71–4, 1 fig.

In a survey of the population of Holland for intestinal protozoa the author detected the presence of *Tricercomonas intestinalis* (=*Enteromonas hominis*) in cultures of stools obtained from four persons. The culture medium consisted of liver infusion agar and diluted horse serum, with the addition of rice starch, in which the flagellate grew at 37°C. Examination of fresh and stained (iron haematoxylin) smears revealed in the flagellate the typical structure : four flagella, of which three are directed forwards, and one runs along the side of the body, terminating in a free end posteriorly. In general the structure of the flagellate agreed with that described originally by WENYON and O'CONNOR, except for the nucleus, in which the chromatin [? karyosome] was situated on the nuclear membrane. In discussing the nomenclature of this flagellate, the author adopts the name *Tricercomonas intestinalis* in preference to *Enteromonas hominis*, by which it is more generally known at present. Since in the present

cases the flagellates were not observed in the stools directly but were recovered in culture, it is thought that the actual incidence of infection with this species is higher than existing records would lead one to suppose. *C. A. Hoare*

RELAPSING FEVER AND OTHER SPIROCHAETOSES

Krakowski, I. & Edelstein, A. **A Brief Survey of 25 Cases of Tick-borne Relapsing Fever, observed at No. 9 Army Hospital.** *Harefuah.* Jerusalem. 1949, May 1, v. 36, No. 9. [In Hebrew 101–3. English summary 103.]

" A benign disease caused by Borrelia sogdianum, a morphologically non-distinguishable strain of Sp. obermeieri. The cases were mostly of longer duration than is usually supposed, but of mild character and without any serious complications. The diagnosis was made by blood smears and ' thick drop ' examinations. Contrary to the literature there was no leucocytosis and we observed at the time of the attack either a normal number of leucocytes or a relative leucopenia. An important diagnostic feature, which also could not be found in the classical or current literature is the high Blood Sedimentation Rate.

" Resistance of B. sogdianum to Salvarsan treatment.

" No active immunization because of probable different serological strains. There was no significant improvement or complete healing after penicillin treatment.

" No definite conclusions could be drawn concerning the prognostic value of the B.S.R.

" After surveying recent literature about local cases of relapsing fever and the occurrence of our cases, the conclusion might be drawn, that this disease is prevalent throughout the whole country."

Babudieri, B. & Bocciarelli, D. **Electron-Microscope Studies on Relapsing Fever Spirochaetes.** *J. Hygiene.* 1948, Dec., v. 46, No. 4, 438–9, 10 figs. on pl.

This paper is a summary of observations, published by the authors in 1943 (*Rend. Ist. Sup. Sanità*, v. 6, 305), on the morphology of relapsing fever spirochaetes as revealed by electron microscopy. One strain each of *Treponema recurrentis* and of *Trep. novyi* were used, the organisms being fixed in osmic acid vapour to avoid alterations during the repeated washings in the centrifuge.

Two forms of spirochaete were constantly present. One with both ends sharply pointed and a second with one pointed and one rounded end. During active reproduction the proportion of treponemes with both ends pointed rose sharply. It is suggested that the form with one rounded end is in the resting phase. Division takes place transversely by central thinning and results in one treponeme of each variety. If division is rapid, the rounded end does not develop, and subsequent divisions increase the sharp-ended forms still more.

The protoplasm appears to be homogeneous, but contains a few vacuoles and granules. No axial filament could be demonstrated. An undulating membrane, 0·05–0·1 μ in breadth, stretches the whole length of the spirochaete. If macerated, it forms fine fibres. In the rounded-end form, but never in the other, terminal flagella or a terminal filament were noted.

The authors consider that the presence of flagella and an undulating membrane bring the genus near to *Trypanosoma*.

[This should be compared with the paper on *Trep. vincenti* by HAMPP *et al.* (*Bulletin of Hygiene*, 1949, v. 24, 444), the illustrations in which show many points of difference. There are 10 illustrations in the present paper.]

J. C. Broom

DUBOIS, A. Pluralité des souches de *Sp. duttoni* dans une région limitée. [**The Plurality of Strains of** *Spirochaeta duttoni* **in a Limited Area.**] *Ann. Soc. Belge de Méd. Trop.* 1949, Mar. 31, v. 29, No. 1, 15–17.

The author previously [this *Bulletin*, 1931, v. 28, 735] showed that two strains of *Spirochaeta duttoni* isolated from different regions of the Congo, about 1,000 miles apart, were immunologically distinct. The present note contains the results of a comparison of four strains of *S. duttoni* isolated from ticks and maintained in mice. Three strains came from one district of the Belgian Congo, Astrida, and one from Kigali, only about 50 miles away ; they were found to belong to two distinct types.

E. Hindle

BLANC, G. & MAURICE, A. Contribution à l'étude du spirochète de Goulimine (Maroc méridional). [**A Contribution to the Study of the Goulimine Spirochaete (Southern Morocco).**] *Arch. Inst. Pasteur du Maroc.* 1949, v. 3, No. 10, 613–15.

Numerous ticks, *Ornithodorus erraticus*, were collected from the burrows of rodents in the region of Goulimine, Southern Morocco, and found to be infected with the spirochaete first recorded from this region by BALTAZARD [this *Bulletin*, 1938, v. 35, 499]. The authors succeeded in producing infections in white mice, and the Barbary ape (*Macaca sylvana*) and also found the spirochaete in the blood of the rodent living in the burrows, *Meriones shawi*. Mice were found to be very susceptible and showed a heavy infection lasting in the blood up to 15 days. The Barbary apes were found to be much less susceptible to this strain than to the louse-transmitted relapsing fever. Five inoculated with blood containing spirochaetes showed rare organisms in the circulation but no febrile symptoms, and one bitten by infected ticks showed no signs of infection. Attempts to infect six human subjects in various ways gave negative results.

The authors provisionally suggest the name of *Spirochaeta* (*Borrelia*) *merionesi* for this organism.

E. Hindle

BALTAZARD, M., SEYDIAN, B., MOFIDI, C. & BAHMANYAR, M. Données expérimentales nouvelles sur la fièvre récurrente épidémique humaine. [**New Experimental Observations on the Epidemic of Human Relapsing Fever.**] *Bull. Acad. Nat. Méd.* 1949, v. 133, Nos. 13/14, 284–9, 2 figs.

The authors summarize some of the information concerning the great pandemic of relapsing fever which started during the recent war, and which, after lasting for more than five years, now seems to have died out. Fifteen different strains of the spirochaete have been isolated and studied in newly-born rabbits [this *Bulletin*, 1947, v. 44, 905]. Eleven were only maintained long enough for their identification ; three were kept for some time in rabbits and lice and then abandoned ; and only one strain, isolated 31st May, 1947, is still being maintained (29th March, 1949).

This strain, R XXIII, after 114 passages shows no alteration in its characters. The pathogenicity remains very low for experimental animals, but it is still very virulent to man, as shown by two accidental infections in the laboratory. It has also been used in the pyretotherapy of 25 cases of general paralysis, for which it is very suitable as it is very susceptible to arsenical treatment.

Very numerous experiments have been made on the louse transmission of the disease with the use of four different strains. The incubation period in man was found to range from 3 to 7 days, depending on the inoculum. Each strain was found to be antigenically distinct, and recovery from any strain, although conferring immunity against the same strain, did not give any protection against the other strains. The relapse spirochaetes were found to be identical with those of the primary attack.

Evidence is produced in support of the view that there is a seasonal cycle in the virulence of this infection in man. During autumn the virulence diminished and in winter completely disappeared, although in young rabbits and lice the virulence remained unchanged. In April, however, the strain was found to have recovered its full virulence which was maintained until the next autumn when the same diminution and disappearance of infectivity to man was repeated.

Concerning evolution in the louse, the authors find that at 32°C. spirochaetes, as such, disappear in 24 to 36 hours ; on the sixth, seventh and eighth days, short forms begin to appear, and become more abundant in the following days. During the negative phase the contents of the lice were still virulent. Lice were found to retain their infectivity as long as they lived, a maximum of 23 days in this series of experiments. The percentage of lice becoming infected after feeding on blood containing spirochaetes seemed to depend on the intensity of the infection, and similarly the intensity of infection depends on the number of spirochaetes in the louse. All the negative results were considered to be due to the ingestion of too few spirochaetes, and the authors were unable to infect any lice by feeding them on human cases in the autumn when the virulence was diminishing. *E. Hindle*

i. Balteanu, I., Russ, M. & Voiculescu, M. Les propriétés spirochétolytiques du sérum de convalescent de fièvre récurrente [**Lytic Properties on Spirochaetes of Convalescent Serum from Cases of Relapsing Fever.**] *Arch. Roumaines Path. Expér. et Microbiol.* 1948, v. 15, Nos. 1/2, 310–12.

ii. ——, Voiculescu, M. & Russ, M. L'action thérapeutique du sérum de convalescent dans la fièvre récurrente. [**Therapeutic Action of Convalescent Serum in Relapsing Fever.**] *Ibid.*, 312–15.

i. In louse-borne relapsing fever, antibodies appear and reach their maximum titre during convalescence. Serum from such cases, when mixed with complement and added to a suspension of spirochaetes, causes granular fragmentation and eventually disappearance of the spirochaetes *in vitro*.

During an epidemic of the disease in Bucharest in 1946, convalescent serum was used in treatment [see below]. This note records a study of the action of the serum *in vivo*.

The authors were struck by the strong and rapid reaction ($\frac{1}{4}$ to $\frac{1}{2}$ hr.) which followed the intravenous administration of convalescent serum to patients during an actual attack. The violent rigor, hyperpyrexia, and aggravation of symptoms—even actual collapse—were followed by quick defervescence and cure in three-quarters of the cases. When intravenous therapy was replaced by intramuscular the reaction was fairly light and resembled normal defervescence. The spirochaetes disappeared from the blood in 3 to 12 hours.

The authors believed that this *in vivo* result corresponded to the *in vitro* destruction of spirochaetes, and was attributable to the presence of products of protein breakdown. They liken the reaction to a rather violent Herxheimer reaction.

Experiments showed that no such reaction followed the intravenous inoculation of (1) relapsing fever convalescent serum into two patients with other acute fevers, (2) normal serum in patients during an attack of relapsing fever, (3) convalescent serum in three patients during the afebrile stage of relapsing fever.

They therefore conclude that : (1) The therapeutic action of the convalescent serum is specific and due to its " spirochaetolytic " properties, (2) it only occurs when the serum is given during the febrile period, when the patient's blood is rich in spirochaetes.

ii. During the great epidemic of louse-borne relapsing fever in North Africa in 1944–45 [this *Bulletin*, 1946, v. 43, 929] convalescent serum was used in treatment with favourable results by a number of workers, *e.g.*, HOFFMANN and WEICHBRODT and BENHAMOU [but no references are given].

The present authors treated 30 patients in this way in Bucharest between January and July, 1946. They give examples of conditions when such treatment is specially indicated, *e.g.*, when arsenical treatment is contra-indicated, not available or ineffective. It is noted that 35 per cent. of relapses followed treatment by salvarsan of Rumanian prisoners having nutritional deficiency.

The serum has the advantage of being free from " toxicity, properly so-called " [but see above] : it can also correct the hypoproteinaemia often seen in relapsing fever, and it is readily obtained on the spot during an epidemic.

The serum was obtained from patients with no previous treatment, from the seventh day of apyrexia, after the third febrile attack. In general, sera were chosen having a minimum spirochaetolytic titre of 1/1,000. After bacteriological control, pooled sera from several convalescents were kept in the refrigerator.

After the severe reactions first encountered in intravenous therapy, this was abandoned in favour of the intramuscular route. The total dose varied from 50 to 120 cc., being in general 1 cc. per kilo of body weight : doses exceeding 50 cc. were given in two injections at an interval of two days.

The first 10 patients served to establish the most suitable form of technique. Of the other 20, 15 were inoculated during the first attack : 12 of these were cured and only 3 had second attacks. Among 94 untreated controls only 8·5 per cent. had another single febrile attack, 44 per cent. had two attacks, 44 per cent. had three and 2 per cent. had four.

In those patients treated with serum the duration of the first attack was 5·66 days, compared with 5·92 to 6·85 days in the controls. It was clear that the treatment arrested the development of the disease, which in four-fifths of the cases showed only one relapse of reduced duration.

Therapeutic efficacy was directly proportionate to the quantity of serum given. The best results were obtained with the use of 80–120 cc. given in two injections at intervals of 24 hours. This resulted in cure of all of 8 patients, while only 4 out of the other 7 were benefited by doses of 50–65 cc.

It is stated that the best time for starting treatment is during the first febrile attack. *H. J. O'D. Burke-Gaffney*

See also p. 675, THORP, DE MEILLON & HARDY, **The Effect of 2 : 3-Dimercaptopropanol (British Anti-Lewisite) on the Toxicity of Neoarsphenamine for *Ornithodorus moubata*.**

YAWS

COSTHUIZEN, S. F. **Yaws.** *Brit. J. Radiol.* 1949, May, v. 22, No. 257, 276–9, 7 figs.

Bone lesions occur in the tertiary stage of yaws, the secondary skin lesions of which usually occur in childhood. Bones are affected in the following order of frequency : tibia, inner end of clavicle, upper limbs, hands, feet and skull. It is uncertain if the vertebral column is affected, but the author refers to cases in which this might have happened. The periostitis and osteitis of yaws resemble those of syphilis. Pain is prominent in the lesions of the long bones, but not in those of the skull, in which swelling is the chief complaint and in which pressure symptoms may occur. Although symptoms are rapidly relieved by arsenical or bismuth therapy, " these drugs provide no cure ; they merely give temporary relief ".

The author describes (1) periosteal changes producing " onion-peel " or lace-work patterns and the production of sabre tibia ; (2) erosion of cortex, usually multiple and with well-defined margins ; (3) cyst-like changes, especially in the skull ; (4) sclerosis often related to (1) and (2) ; (5) sequestrum formation, particularly in hands and feet ; (6) changes in contour of bones. Joints are not usually involved. Differentiation from syphilitic bone lesions may be very difficult.

[There is no indication of the country of origin of the lesions described, clinical or serological data upon which diagnosis was based, or the number of cases upon which the author's generalizations are based. One would like to know his reason for the conclusion that the effects of arsenical and bismuth therapy are merely palliative. No reference is made to secondary bone lesions, especially in children, which are probably more frequent in many parts of Africa than tertiary bone lesions in adults. There are no references to any publication on the bone lesions of yaws : see this *Bulletin*, 1946, v. 43, 1091.]

C. J. Hackett

FRIEDHEIM, E. A. H. **A Five Day Peroral Treatment of Yaws with STB, a New Trivalent Arsenical.** *Amer. J. Trop. Med.* 1949, Mar. v. 29, No. 2, 185–8.

The author discusses the essential characters of the ideal drug for the treatment of yaws in rural populations. They are, wide safety margin, ease of administration, short course of treatment, stability under tropical conditions and low cost. " We have now prepared a relatively non-toxic and stable form of 4-oxy-3-acetylaminophenylarsenoxide, *i.e.*, the trivalent derivative of acetarsone [acetarsol], and find that this compound, designated ' STB ' approaches closely the characteristics set forth as being desirable for mass treatment in undeveloped territories."

Clinical tests were made in mountainous forest regions of Gueckedou, French Guinea, in 88 cases of secondary yaws. The daily dose used was " 0·01–0·02 gr." [presumably gramme] per kgm. body weight by mouth in single doses on five consecutive days. No signs of intolerance were observed. Patients were observed for three months, when 87 of the 88 patients were regarded as cured [presumably on clinical evidence only as no serological data are reported].

[A number of statements are made, such as " Tartar emetic has had to be banned altogether from use in the Kissi tribe of Sierra Leone, where even greatly reduced doses caused death," for which no authority is given by the author or known by the reviewer.] *C. J. Hackett*

LEPROSY

CANIZARES, O. **New Official Classification of Leprosy.** *Arch. Dermat. & Syph.* 1949, May, v. 59, No. 5, 584–6.

The author discusses the findings of the 5th International Congress for Leprosy held in Havana, Cuba, in April 1948 [this *Bulletin*, 1949, v. 46, 52] with special reference to the superiority of sulphones in treatment and to the new classification which will supersede the Cairo classification.

As the recommendations of the Classification Committee of the Congress have not yet been published in detail in this *Bulletin* the relevant text of their Report is reproduced here in full :—

" The Classification Committee of this Congress, in a serious attempt to reconcile and unify these apparently discordant systems, has arrived at a formula which is believed to be based on a biologic interpretation of the clinical facts. The criteria on the basis of which the three classes herein defined are established are, in diminishing order of availability : (1) clinical, (2) bacteriological, (3) immunological, and (4) histopathological.

" It is proposed that the classical division of leprosy into two types ' polar ' (Rabello, 1938) in their essential characteristics and relatively stable in their evolution, be recognised and maintained, and that they be designated :

" *Lepromatous* (malignant, or gravis) : symbol, L.

" *Tuberculoid* (benign, or mitis) : symbol, T.

" It is also proposed that, in addition, recognition be given a *group* of cases of less distinctive or positive characteristics less stable and less certain with respect to evolution, and that it be designated : *Indeterminate* (undifferentiated) symbol I.

Definitions

" The characteristics of these three classes of leprosy are as follows :—

" *Lepromatous type.* Minimal resistance to the existence, multiplication and dissemination of the bacilli ; constant presence of large numbers of bacilli in the lesions, with a distinctive tendency to form globi ; characteristic clinical manifestations in the skin, mucous membranes (especially of the upper respiratory tract and eye), and/or the peripheral nerves, together with involvement of other organs ; regular failure to react to lepromin ; pathognomic granulomatous structure of the lesions ; marked stability of type and a tendency to progression. These cases are ' infectious ' or ' open '.

" *Tuberculoid type.* High resistance to the existence, multiplication and dissemination of the bacilli ; bacteriologically negative as a rule or, if positive, with few bacilli except in reactional states : characteristic clinical manifestations, mainly in the skin and nerves, tending to be limited in extent and varying in degree with the reactivity of the tissue ; reactivity to lepromin in a very high percentage of cases ; nearly always a tuberculoid granulomatous structure in active lesions : marked stability, and a strong tendency to spontaneous regression in the absence of repeated reactions. These cases are usually ' non-infectious ' or ' closed '.

" *Indeterminate group.* Variable with respect to resistance, clinical manifestations chiefly in the skin and nerves ; the skin lesions usually flat macules, either hypochromic, erythemato-hypochromic or erythematous ; bacteriologically negative as a rule or, if positive, with few bacilli ; lepromin reaction usually negative or moderately positive ; the lesions histologically of simple inflammatory nature ; stability much less than in either of the polar types ; and a variable tendency with regard to persistence, progression or regression, or transformation into one of the polar types. These cases are usually ' non-infectious '.

" Clinical Subdivision of Cases

" The fundamental aim of any classification of a leprosy case being the determination of the type or group to which it belongs, in accordance with the foregoing definitions, certain members of the Classification Committee held that the ' subtypes ' of other systems merely correspond to clinical aspects of variable importance. These aspects can be considered from different points of view, namely :—

" *Degree of severity* (as, for example, the L_1, L_2, L_3, of the Memorial Conference classification) ;

" *Manner of evolution* (slow or rapid, stationary or progressive, reactional states, etc.) ;

" *Localization* (skin, nerve, eye, systemic, etc.) ;

" *Morphology* (macules, nodules, ' plaques ', diffuse infiltrations, etc.) ;

" *Clinical form* (classical nodular lepromatous, diffuse lepromatosis of Lucio, etc.)." *H. J. O'D. Burke-Gaffney*

Queensland : Annual Report on the Health and Medical Services of the State of Queensland for the Year 1947–48. pp. 7–8. **Leprosy** [Reye, E. J. & Mahony, F.].

In Queensland there were 52 white patients with leprosy on Peel Island at the end of June, 1948, of whom 42 were males. The average age was 47 years and there were six over 70. There were three deaths from intercurrent disease. All patients co-operating received sulphone therapy. It is stated that promin therapy was " highly satisfactory in view of the fact that a number of cases receiving it were in a very serious condition and that at the end of twelve months all were out of danger " Nevertheless the use of this drug was abandoned in view of the time required for its administration. Fourteen patients completed the full year's treatment and 12 others received 6 months' treatment each.

The administration of diasone was easier, as it is given by the mouth : it was given to those not on promin in November, 1947, and to those who had been on promin for a full year. The results have " so far been quite satisfactory." No transfusions were necessary, any anaemia occurring being amenable to ordinary measures. There was one case of severe granulopenia which responded to pentosenucleotide, penicillin and liver extract.

Diasone treatment was continued by discharged patients under the supervision of their own doctors : it is hoped eventually that this treatment will be available for most of those patients on parole and for those in the non-infectious stages.

No surveys among aboriginals were possible, but there was " a number of admissions to Fantome Island during the year " among cases suspected in the last survey.

The difficulties of diagnosis, and the shorter periods of contact and incubation in aboriginals are discussed and the need for thorough and extended examination of known contacts is stressed. " The present state of the disease in Queensland remains virtually unknown."

Great improvements in the general amenities at Peel Island are recorded, especially as regards conversion of Army huts into additional accommodation and the introduction of an electric light plant and cinema equipment.

H. J. O'D. Burke-Gaffney

Oteiza, A., Gonzalez Prendes, M. A. & Ibarra Perez, R. Estado actual de la lepra en Cuba. [**Present State of Leprosy in Cuba.**] *Rev. Sifilografía, Leprología y Dermatología.* Marianao, Cuba, 1948, July–Dec., v. 5, No. 3, 283–9.

A paper read at the recent Fifth International Congress on Leprosy, telling of the researches of the Society for the Prevention of Syphilis, Leprosy and Diseases of the Skin (P.S.L.E.C.). This body has established dispensaries in different parts of the island, each with its medical director who has specialized in venereal and skin diseases, a medical staff, nurses and laboratory technicians. The larger dispensaries have dentists also. All treatment is free and nurses visit the homes of patients, examine contacts and use persuasion to get them to attend at the dispensary. If patients cease to attend, notice is sent to them and, if that is not enough, they are visited personally. The School Hygiene Department reports through the Minister of Education to the P.S.L.E.C. any children suspected of leprosy.

In Cuba, with a population of 4,778,583, there are 3,001 leprosy patients (62·8 per 100,000) of whom 2,358 are ambulatory (78·5 per cent.) and 643 are in hospital; 876 are in Oriente Province, 526 in Havana, 443 in Las Villas, 303 in Camagüey, 148 in Matanzas and 62 in Pinar del Rio. 1,275 are males, 1,013 are females, the sex of 70 is not recorded; 1,122 are of the lepromatous type, 457 unspecified, 374 tuberculoid and 405 not known (or not recorded). As regards race, 1,616 are white, 414 are half-castes, 299 blacks, 12 yellow and 18 are not known. [See also this *Bulletin*, 1946, v. 43, 563, 933.]

H. Harold Scott

Angel Ibars, D. Técnicas de coloración del "Mycobacterium leprae". [**Methods of Staining** *Mycobacterium leprae.*] *Rev. "Fontilles."* Valencia. 1949, Jan., v. 2, No. 3, 231–6.

This paper comprises four sections: 1. General staining of the organism; 2. Staining of the Lutz granules; 3. Difference of staining of living and of dead organisms: 4. Differential staining from *Myco. tuberculosis.*

Nine methods are included under the first, but the one recommended is that of v. Halleberg:—

i. *Stock solution*:

Propionate of sodium (or potassium acetate)	1 gm.
Alcohol, 90 per cent.	100 cc.
Night Blue	5 gm.
Bismarck Brown	0·4 gm.

For use, 10 cc. of this is mixed with 90 cc. distilled water. The stain is added to the slide, heated to boiling, allowed to cool for 5 minutes, washed with distilled water, decolorized with the following till no more stain comes away.

Nitric acid, 25 per cent.	4 cc.
Alcohol, 70 per cent.	100 cc.

Leave to dry. The bacilli appear blue on a dark background.

Under the second, staining of granules, again several methods are mentioned, but all are modifications of Much's method except Spengler-Sphel's rapid method: Fix by heat, stain by warming for 2–3 minutes in a mixture of fuchsin 3 parts, gentian violet 2 parts; pour off and, without washing, add saturated picric alcohol for one minute, wash with alcohol 60 per cent., decolorize with dilute acetic acid (1 in 6) and afterwards with alcohol 60 per cent. Stain with saturated picric alcohol (or trypaflavin) for one minute. On a yellow background the bacilli appear rose-red, and the granulations a dark violet, almost black.

For the third, the Aoki erythrosin and methylene blue method is recommended. After fixing by heat, the slide is covered with the following for 5 minutes, the stain being used hot (at 80°C.)

Erythrosin	1 gm.
Picric acid	0·15 gm.
Distilled water	100 cc.

Place the specimen in a solution of potash (KOH 5 gm., alcohol absolute 30 gm., aq. dest. 70 cc.) for one minute, then wash and stain with

Saturated alcoholic solution of methylene blue	15 gm.
Distilled water	100 cc.

Living organisms are coloured bright red and the dead or nearly dead are dark blue to violet.

Lastly, for differentiating from *Myco. tuberculosis*, Yamamoto's method is recommended. Place in hot silver nitrate, 5 per cent. at 55–60° for 10 minutes and then in the following :

Tannin	1 gm.
Pyrogallic acid	2 gm.
Distilled water	100 cc.

for 5 minutes ; wash and dry.

Tubercle bacilli are stained black, *Myco. leprae* do not stain, but can be stained by Ziehl's method for greater certainty. *H. Harold Scott*

Miguel, S. & Miró, J. El corazón en la lepra. [**The Heart in Leprosy.**] *Rev. "Fontilles."* Valencia. 1949, Jan., v. 2, No. 3, 202–26, 8 figs. [20 refs.]

The English summary appended to the paper is as follows :—

" The authors study 38 cases of leprosy of the Colony-Sanatorium of Fontilles, examining the heart in order to know the participation of this organ in leprosy. Five pathologic cases are referred all of them myocarditis, in which one suspects the leprosy as an etiological factor."

Schujman, S. Es menos activo el aceite de chaulmoogra y sus derivados que las sulfonas en el tratamiento de la lepra ? [**Is Chaulmoogra Oil and its Derivatives less Active than Sulphones in the Treatment of Leprosy ?**] *Prensa Méd. Argentina.* 1948, Dec. 31, v. 35, No. 53, 2499–2508, 14 figs. [11 refs.] English summary.

There are physicians who cling to chaulmoogra and regard it or its derivatives as the only efficacious form of treatment in leprosy. Others, having obtained good results with promin, go to the other extreme and say that, compared with promin, chaulmoogra is useless. Others again, after trying chaulmoogra, get better results with promin.

In this short paper the author tells of his experience with each of these drugs and reproduces photographs showing the results in patients with tuberculous and nodular leprosy and with the macular form. These photographs seem to show that equally good results follow the use of either and the author concludes, after having treated 80 patients with the lepromatous form, that injection of 20–30 cc. of chaulmoogra weekly for two years gives as good results as treatment with promin, but it is essential that adequate doses should be given over a sufficiently long period ; secondly, still greater benefit may be obtained in some cases by a combination of both drugs, used alternately. His illustrations, both of patients and of the tissue changes brought about, would appear to confirm this, namely that the results are equally good. *H. Harold Scott*

Chover Madramany, P. La traqueotomia y las sulfonas en la lepra. [**Tracheotomy and Sulphones in Leprosy.**] *Rev. " Fontilles."* Valencia. 1949, Jan., v. 2, No. 3, 227–30.

Tracheotomy is not often called for in leprosy and then mostly as an emergency to prevent suffocation from laryngeal blocking. In ten years, among 500 patients with leprosy 12 have undergone this operation, 8 women and 4 men. Of these, 9 have died, 1 within 48 hours, it was thought from some intercurrent infection, 3 at the end of one year, 3 after two years, 1 at three and one at four years ; the remaining 3 have a tracheal cannula, 1 five years later, 1 two years and 1 seventeen months after operation. If care were taken to keep the nostrils clear, tracheotomy would be even less often called for.

Promin is regarded by the author as almost specific for leprous laryngitis and it should be prescribed when hoarseness is a symptom of the disease. In fact, he sums up his opinion is these words (translated) : " Promin is for leprous laryngitis what streptomycin is for tuberculous laryngitis." [No details are given as to dosage.] *H. Harold Scott*

HELMINTHIASIS

Lafuente, M. Les parasites intestinaux au Gabon. Résultats d'une enquête dans la région de l'estuaire. [**Investigation of Intestinal Parasites in the Gabon Estuary Region.**] *Bull. Soc. Path. Exot.* 1948, v. 41, Nos. 9/10, 588–91.

The author carried out a parasitological examination among African labourers and their families in an equatorial forest area in the estuary of the Gabon, 50 kilometres SE. of Libreville. A specimen of faeces was examined on a slide by the direct method, without concentration.

Of 525 persons, 452 (86 per cent.) were found to be infected. The parasites found were *Ascaris* (280), Hookworms (243), *Trichuris* (174), pathogenic amoebic cysts (11), *Strongyloides* (5), and *Trichomonas* (3). The infection was multiple in half the cases, including a treble infection in 36.

The author is convinced that much mortality and morbidity among children and infants can be ascribed to parasitic infections. *L. E. Napier*

Sandosham, A. A. **Some Parasitological Facts of Significance to the Clinician in Malaya.** *Proc. Alumni Assoc. King Edward VII College of Med.* Singapore. 1948, Oct., v. 1, No. 1, 45–52.

General observations without references.

Ferreira, F. S. C. As parasitoses intestinais na Guiné Portuguesa. [(**Human**) **Intestinal Parasitosis in Portuguese Guinea.**] *Gaz. Méd. Portuguesa.* 1949, v. 2, No. 1, 148–52.

Among 2,340 persons presenting themselves for treatment at the Institute of Tropical Medicine in Portuguese Guinea, 505 had faecal examinations made, direct or by the Willis, Telemann-Lima or Faust method. Two hundred and ninety-four (58 per cent.) contained parasites of one kind or another ; 251 had single infections (224 worms only, 27 protozoa only) and 43 had mixed infections. Of the helminthic infestations, hookworm 178 (79·5 per cent.) was far the most common, with *Taenia saginata*, 23 (10·2) next ; *Ascaris* and *Trichuris* cases were few, only 6 each, *Enterobius*, 5 and *Taenia solium*, 4, *Strongyloides*, 2.

Of the 27 protozoal cases, 23 were *Entamoeba coli*, 2 were *E. histolytica* and 2, *Giardia intestinalis*. Taking all into consideration, single and mixed, helminthic and protozoal, ankylostomes were found in 63·2 per cent., *E. coli* in 12·9, *T. saginata* in 7·9, *Trichuris trichiura*, 4·1, *E. histolytica*, 3·5, *Ascaris lumbricoides*, 2 ; the others in very small numbers only.

The symptoms are mentioned and consisted mainly of abdominal discomfort, diarrhoea and, in dysenteric patients, tenesmus, but many had no subjective complaints at all and the infection was found by chance when the faeces were examined. *H. Harold Scott*

Shousha, A. T. **Schistosomiasis (Bilharziasis) : a World Problem.** *Bull. World Health Organization*. Geneva. 1949, Mar., v. 2, No. 1, 19–30. [17 refs.]

Sir Aly Tewfik Shousha divides his paper into several sections, dealing respectively with the history of schistosomiasis, life cycle of the parasites, distribution and importance of the disease, treatment and prevention in Egypt. The three first sections are very brief, and the section on treatment refers mainly to the use of tartar emetic (the potassium salt) in Egypt. Here he shows that whereas in 1925 the surgical complications of schistosomiasis were relatively common (50·7 per 10,000), they were much more rare (2 per 10,000) in 1933 ; this reduction is ascribed to the effect of drug treatment on a large scale. Both *S. haematobium* and *S. mansoni* infections are involved.

The author estimates that in Egypt some 10,000,000 people suffer from these infections, and he notes that the unpleasant effects of tartar emetic are such that many patients prefer the chronic disease to the treatment, and therefore refuse to accept or finish it. " It is hopeless to try to eradicate the disease by treatment," partly because reinfection is almost inevitable. " Control of the disease by prevention of pollution and by propaganda is equally hopeless." Control by eradication of snails is possible in Egypt, where the water system of the whole country is more amenable to supervision than in most other regions. The means in use include clearance of vegetation from canals, drains and ponds, drying (which is not effective as the snails survive the 40 days of winter closure of canals), canal alternation, underground irrigation or drainage (very expensive), the use of poisons (copper sulphate is most commonly used) and of traps. *Charles Wilcocks*

Pipkin, A. C. & Rizk, E. **Vesical Schistosomiasis in the Middle East with a Report of Two New Foci in Northern Syria.** *Amer. J. Hyg.* 1949, May, v. 49, No. 3, 276–84, 1 fig. [11 refs.]

After a study of the limited literature on the prevalence of schistosomiasis in Syria, schistosomiasis surveys were undertaken of the Northern and North-Eastern parts of the country. Two foci of endemicity of *Schistosoma haematobium* were disclosed ; these were some 150 miles apart and sited on tributaries of the upper Euphrates river on the Turkish border of Northern Syria. In one of these (Koubour El Bid) 337 of 545 persons of all ages and both sexes examined in 19 villages were found, on a single examination, to be passing viable eggs of the worm in the urine. This high infestation rate (61·8±2·2 per cent.) is comparable to that among the Egyptian fellaheen and for the lower Euphrates-Tigris focus in Mesopotamia, and higher than that recorded for the Palestinian focus. In spite of this high figure reasons are advanced for considering the disease to be localized to the area. While shells of a *Bulinus* sp. (probably *truncatus*) were found, no snails infected with the human schistosomes were recovered. In the other area surveyed (Tel-Abiad) persons from only five villages were examined, but nearly 100 per cent. of the males and 60 per cent.

of females were found infected. In view of the nomadic habits of the local Bedouins in this second area, further extension of the infection is likely to take place in this locality. *A. R. D. Adams*

WATSON, J. M. & ALI AL HAMAMI. **Studies on Bilharziasis in Iraq. Part II. Incidence in the City of Baghdad. An Analysis of over a Thousand Random Urine Samples with reference to Age, and Locality.** *J. Faculty of Med., Baghdad, Iraq.* 1949, Jan., v. 13, No. 1, 49–62, 1 plan. [11 refs.]

Schistosoma haematobium infection has long been endemic in Baghdad, but the exact incidence has not hitherto been systematically investigated. The authors took specimens of urine, at random, from out-patients attending the Endemic Diseases Department of the Royal Hospital. Very few of their subjects were at the hospital directly because of this infection, and they make the point that, as in other places where it is endemic, the early symptoms (haematuria and pain on micturition) are not regarded seriously by the patients. In all they examined 692 males and 491 females, the incidence rates being 27 and 14 per cent. respectively. Incidence varied from 15 to 22 per cent. in the decades up to age 50 : at ages over 50 it was only 4 per cent.

The authors discuss these findings, emphasizing the fact that little or no immunity is conferred by the infection, and that in Baghdad it is by no means a disease chiefly affecting children. Males are more commonly affected than females because they work in infested irrigation water, and bathe in it, whereas women are chiefly exposed when washing clothes, and the disturbance they create in the water, even if soap is not used, is surely a deterrent to the cercariae.

There was little difference in the distribution of infection in people living on the east bank of the river, compared with those of the west bank, and the incidence in the different zones was fairly constant. *Bulinus truncatus* has previously been found in canals in the city, and it was known that many of the patients examined had never been outside Baghdad ; it appears certain, therefore, that the disease is transmitted in the city.

[For Part I of this series see this *Bulletin*, 1949, v. 46, 554.]

Charles Wilcocks

GELFAND, M. & ROSS, W. F. **The Incidence of Schistosomiasis in South Central Africa.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, May, v. 42, No. 6, 559–64.

The incidence of schistosomiasis in sundry parts of Africa has been determined by various workers on the basis of microscopical examination of stools and urine. This method is open to criticism, especially if only one, or very few, specimens are examined from each person. The collection of rectal and bladder biopsy specimens is impracticable for survey purposes, and this technique, though good, is not an infallible diagnostic procedure. Similarly, the collection of material from the rectum by digital scraping, or by a Weller's scraper, is unsuitable for large-scale investigation.

Routine digestion, in 10 per cent. potassium hydroxide for 24 hours at 37°C., of the entire rectum and bladder of all patients coming to autopsy, and examination of the deposit for schistosome ova, affords the most accurate means of determining the infestation rates with the urinary and rectal schistosomes in a population. Disadvantages are the time that must elapse before a sufficiently large series of cases can be accumulated, the need for trained staff and special facilities, and the doubt that remains as to the degree of activity of the infection when disclosed by this means. Organs from 115 male and 35 female Africans from Northern and Southern Rhodesia, from Nyasaland, and from Portuguese

East and Portuguese West Africa, were examined in this manner; from 147 (98 per cent.) of these 150 cases schistosome ova were recovered. There is thus a high incidence of schistosomiasis in this wide area of South Central Africa, and the infestation rate revealed by this technique is far in excess of those previously published but based on the examination of the living. As a negative finding does not warrant the assumption that infestation is absent, it is probable that every African from this part of Africa has or has had schistosomiasis. One hundred and forty-six (99·3 per cent.) of these 147 infected persons harboured *S. haematobium*, 72 (48·9 per cent.) *S. mansoni*, and 71 (48·3 per cent.) both parasites. In only one single case was a pure *S. mansoni* infestation identified. *S. haematobium* ova were recovered from the bladder at 134, and from the rectum at 112 autopsies; from the bladder but not from the rectum in 22 cases, and from the rectum but not the bladder in 8. *S. mansoni* ova were recovered from the rectum at 67 autopsies, from the rectum and bladder at 5, from the rectum but not the bladder at 62, and from the bladder but not the rectum at 3.

Examination of small snips from the rectal and from the bladder mucosae showed the presence of ova in 117 of the 134 proven cases of bladder infestation (86 per cent.), and 107 of the 137 proven cases of rectal infestation (78 per cent.). Ninety-two cases of 134 (68·6 per cent.) with bladder snips containing *S. haematobium* ova also had these ova in rectal snips. *A. R. D. Adams*

MEIRA, J. A. **Schistosomiasis mansoni : a Survey of its Distribution in Brazil.** *Bull. World Health Organization*. Geneva. 1949, Mar., v. 2, No. 1, 31–7, 1 fig. (map). [14 refs.]

This paper includes a useful map which shows that infection with *Schistosoma mansoni* is very common along the coast of Brazil from the Ceará province in the north to Rio Grande do Sul in the south. Foci are also found well inland, especially in the provinces of Pernambuco, Baia and Minas Gerais. A list of infected localities is also given: there are 364 such localities, and there are probably nearly 3 million persons (in a population of 45 millions) suffering from the infection. *Charles Wilcocks*

TIDY, H. **Ayerza's Disease, Silicosis, and Pulmonary Bilharziasis.** *Brit. Med. J.* 1949, June 4, 977–8. [11 refs.] [Summary appears also in *Bulletin of Hygiene*.]

In Ayerza's disease in Brazil, as first fully described in a monograph by ARRILLAGA of Buenos Aires in 1913, the predominant pathological change is sclerosis of the pulmonary artery and its branches, with the associated lung changes; Arrillaga's subjects were adults, and clinically cyanosis was an outstanding feature of the syndrome. Since Arrillaga's publication small numbers of isolated cases of Ayerza's disease have been recorded from all parts of the world; these have been of all ages and in few of them was the aetiology clear.

In 1928, SOROUR (*C.R. Congr. Int. Méd. Trop. Hyg.* Cairo, 1932, v. 4, 321) gave a fresh account of the pathology, and AZMY and EFFAT of the clinical picture (this *Bulletin*, 1932, v. 29, 411) of cases of Ayerza's syndrome diagnosed in Egypt. Others in Egypt have since studied the clinical picture and pathology of the condition as seen there, and it is now possible to diagnose it in its early stages, and it is increasingly being detected. The initial lesion in Egypt is an obliterative endarteritis of the small branches of the pulmonary artery, due to schistosome ova [spp. not stated] reaching the region embolically; this, with reinfection, extends to the main branches of the artery which may become aneurysmal and cor pulmonale develops; the lung parenchyma remains

uninvolved. While the hypertrophied right ventricle succeeds in forcing sufficient blood through the obstruction there is no cyanosis; when it fails to do so cyanosis appears. The Egyptian cases differ from the Brazilian in that cyanosis is not marked in the former and the pulmonary symptoms are slight.

There are thus two distinct regions where pulmonary arterial sclerosis is known to be relatively common, Brazil and Egypt. In Brazil gold mining at an altitude of 14,000 feet is the local industry; silicosis may be the primary aetiological factor, and the great altitude may cause the severe cyanosis characteristic of the condition in this area. Removal to a lower altitude has been shown to diminish the cyanosis in these cases. Pulmonary bilharziasis does not seem to have been reported from Brazil, where *Bilharzia mansoni* is the prevalent schistosome. In Egypt schistosomiasis is the primary aetiological factor, and cyanosis is not a feature of the syndrome until terminally when the heart fails. Nevertheless, in Brazil also, the possibility of pulmonary schistosomiasis as a main or contributory factor in Ayerza's disease should be borne in mind.

A. R. D. Adams

Blair, D. M., Hawking, F., Meeser, C. V. & Ross, W. F. **Miracil. Clinical Trial on Patients infected with** *Schistosoma haematobium* **and** *S. mansoni*. *Brit. J. Pharmacol. & Chemotherapy*. 1949, Mar., v. 4, No. 1, 68–80. [13 refs.]

The thioxanthone Miracil D, synthesized in Germany, was found by Kikuth & Gönnert [this *Bulletin*, 1949, v. 46, 481] to be active against experimental infections with *S. mansoni* in mice and monkeys. Watson *et al.* used the drug in treatment of schistosome infections in Egypt [*ibid.*, 1948, v. 45, 1018] and Blair *et al.* have given a preliminary report of their findings in S. Rhodesia [*ibid.*, 1948, v. 45, 526]. The drug is best given by mouth, as subcutaneous or intramuscular infection causes irritation. Most patients in the present trials were young Africans with active infections. After clinical examination, the drug was administered usually as 100 mgm. tablets by mouth and at intervals examinations of urine or faeces were made for eggs or miracidia. In one series, 44 young persons, some with double infections of *S. haematobium* and *S. mansoni* were treated with daily doses of 0·2 to 0·3 gm. of Miracil D on 6 days per week over a period of 3 weeks. The follow-up was made at weekly intervals over a period of 16 weeks or longer. After 12 weeks, 11 patients with *S. haematobium* infection and 1 with *S. mansoni* appeared to have been cured. The infections in these cases were originally light and those with double infections were sometimes freed from one species of parasite only. In a second series of 13 boy patients, the dose of drug was increased to 0·6 gm. daily and was given on 12 occasions. The total dosage was 35 to 150 mgm. per kilo. After 4 months, four of them appeared to be cured. When 18 school children also infected with *S. haematobium* were given doses of 0·5 to 0·7 gm. of Miracil D daily over a period of 10 days, 12 of their number were not passing viable eggs at the end of 15 weeks. Some adult patients in hospital were given as much as 1·8 gm. daily for a period of 6 days. Results in their case were favourable.

The description of treatment, which is given in great detail, should be consulted in the original by those interested. Treatment did not affect haemoglobin levels or white cell numbers of the blood, and there were no gross changes in urine. Only one European (included in the first series) showed yellow colouration of the skin and conjunctivae. Anorexia, nausea, abdominal pain and vomiting occurred in some groups of patients. In one case pruritus and a herpetiform rash occurred, possibly due to schistosome disintegration. No serious toxic manifestations were noted. The drug did not accumulate in the

body, and was estimated in blood by the method of LATNER *et al.* [this *Bulletin*, 1948, v. 45, 96].

As supplies were limited, only one African patient in each instance was treated with Miracil A, B and C respectively, the total dosage being 1·5 to 1·8 gm. in a period of two weeks. These substances are xanthones in which the sulphur atom of Miracil D has been replaced by oxygen, together with other minor changes in the molecule. No cures were obtained. Evidence has been obtained that a large proportion of patients harbouring *S. haematobium* can be sterilized of this infection by safe doses of Miracil D, but *S. mansoni* responds less well to treatment. The intensity of dosage appears to modify the results obtained and further investigation is indicated, particularly in order to define more accurately the maximum tolerated dose, whether dangerous idiosyncrasies exist and how the therapeutic effect of large doses compares with that of antimonials. *J. D. Fulton*

ZIEVE, L. & CONLEY, R. H. **Chronic Schistosomiasis Japonica diagnosed by Rectal Biopsy : Report of Case.** *Minnesota Med.* 1948, Dec., v. 31, 1331.

OLIVIER, L. **The Penetration of Dermatitis-producing Schistosome Cercariae.** *Amer. J. Hyg.* 1949, Mar., v. 49, No. 2, 134–9.

" Observations were made on the penetration of human skin by cercariae of *Trichobilharzia stagnicolae*, the chief cause of schistosome dermatitis in the United States. It was found that the cercariae will penetrate while fully submerged and, therefore, do not require an evaporating film of water to stimulate or aid penetration. In some tests the cercariae penetrated from relatively cool water (17°C. to 23·5°C.), the temperature of which changed little during the exposure period. It was also found that the itching associated with penetration of the cercariae occurs very soon after the cercarial body enters the outermost layer of the skin and that, therefore, this primary itching may be taken as a reliable indicator of the time of penetration of the cercariae. Primary itching was found to begin from 4 to 10 or more minutes after the cercariae were placed on the skin, indicating that the cercariae remain on the surface of the skin for some time before penetrating."

OLIVIER, L. **Schistosome Dermatitis, a Sensitization Phenomenon.** *Amer. J. Hyg.* 1949, May, v. 49, No. 3, 290–302, 2 figs. [15 refs.]

In 1928 CORT [this *Bulletin*, 1928, v. 25, 946] showed " swimmers' itch " in Michigan, U.S.A., to be due to non-human schistosome cercariae. MACFARLANE [*ibid.*, 1944, v. 41, 947] identified a non-human schistosome cercaria causing a similar condition in New Zealand, and suggested that sensitization resulted from repeated exposure to it. The matter was deemed worthy of further study. Cercariae of *Trichobilharzia stagnicolae* from the snail *Stagnicola emarginata angulata*, of *Trichobilharzia ocellata* from *Lymnaea stagnalis*, and of *Schistosomatium douthitti* from *Stagnicola palustris* were applied to the forearms of volunteers at the N.I.H. laboratory, Bethesda, and at the University Biological Station, Michigan. Typical schistosomal dermatitis was produced in susceptible persons by any of these, and the lesions produced were undifferentiable.

Of 34 persons exposed for the first time (as far as could be ascertained) to cercariae of *Trichobilharzia stagnicolae* all but one suffered only a mild reaction with inconspicuous lesions. The odd case had a more severe reaction, and investigation of his history suggested he might have been exposed to *Schistosoma mansoni* cercariae in Porto Rico previously. Twenty-seven volunteers were then exposed to from 2 to 8 further attacks by the same

cercariae at irregular intervals (a few days to about 120 days) ; and increasing reactions, culminating in some cases in typical schistosome dermatitis, developed in 21 of them. In some of these persons on re-exposure to infection reactivation of earlier lesions was observed. The reactions were not a local phenomenon, as changes in the site of application of the cercariae still produced them ; they were essentially allergic in nature, and there is evidence that a sensitization once acquired may persist for some years. *A. R. D. Adams*

KENDALL, S. B. *Lymnaea stagnalis* **as an Intermediate Host of** *Fasciola hepatica*. [Correspondence.] *Nature*. 1949, June 4, 880–81.

Hitherto the possibility of British species of *Lymnaea* other than *L. truncatula* acting as vectors of *Fasciola hepatica* has been open to doubt. The author now describes experiments carried out at Weybridge Veterinary Laboratory which prove that *F. hepatica* is capable of completing its development in *L. stagnalis* with the emergence of cercariae and ultimate infestation in mammals.

The snails used were freshly hatched second generation specimens, reared in the laboratory under strict conditions. Massive exposure to fresh miracidia of *F. hepatica* resulted in infection occurring in 13 of 101 experimental snails : from one of these, 99 perfect cercariae emerged and four of these infected a rabbit orally. In six weeks a half-grown *F. hepatica* was recovered from the bile ducts.

Failures by previous workers to infect adult specimens of *L. stagnalis* are referred to and it is suggested that immature specimens are more susceptible than are adults.

The author suggests however that this observation may have little significance from the veterinary point of view, because of the aquatic habit of *L. stagnalis*, which appears to be confined to permanent water. The biological significance of the finding is however stressed and is being followed up in relation to other species of *Lymnaea*. *H. J. O'D. Burke-Gaffney*

FUENTES DELGADO, M. Formas anatomoclinicas de la cisticercosis cerebral. [**Anatomical and Clinical Forms of Cerebral Cysticercosis.**] *Gac. Méd. de México*. 1948, Aug. 31, v. 78, Nos. 3/4, 156–73, 7 figs. on 6 pls.

DESCHIENS, R. Les substances toxiques vermineuses, leur pouvoir pathogène, leur identification. [**The Pathogenic Power of Toxic Substances in Helminths.**] *Ann. Inst. Pasteur*. 1948, Nov., v. 75, No. 5, 397–410, 5 figs. [22 refs.]

The following is a free translation from the French of the author's summary :

Pathogenic products of helminthic origin can be divided into two groups according to the nature of their effects. 1. Polypeptide toxic substances. 2. Protein, glucolipid, and *polyholoside* [*sic.*, ? polysaccharide] substances having allergic and anaphylactic properties. Those of the second group are eosinophilogenic ; those of the first group are not.

The pathogenic action of toxic helminthic substances can be demonstrated experimentally in guineapig, cat and rabbit either by acute or chronic intoxication ; the disease caused by this experimental method resembles that occurring under natural conditions.

Acute and chronic intoxication due to toxic helminthic substances produces biological reactions and a symptomatology comparable with those of acute or chronic histamine intoxication.

The pathological anatomy of lesions due to chronic helminthic intoxication consists of inflammatory oedematous infiltration and necroses which are selective in lungs, kidneys and liver. A plastic helminthic anaemia is also often observed.

The toxic helminthic substances belonging to the polypeptide group are not identifiable with histamine, but they can be assumed legitimately to be basically amine or amino-acid and related to, or capable of liberating or forming, histamine in the organism.

Helminthic substances having allergic or anaphylactic properties are distinct from toxic helminthic substances ; they seem to resemble in particular protein fractions properly speaking, gluco-proteins and polyholosides.

From the practical aspect, bearing in mind that fundamentally the treatment of helminthiases belongs to the sphere of chemotherapy and galenotherapy, a knowledge of toxic helminthic substances is concerned not merely with the interpretation of certain parasitic diseases, but also with the possibility of arriving at antitoxic and symptomatic treatment in acute conditions.

J. J. C. Buckley

Deschiens, R. & Poirier, M. Anatomie pathologique de l'intoxication expérimentale subaiguë et chronique par les substances toxiques vermineuses. [**Pathology of Subacute and Chronic Intoxication in Experimental Animals by Toxic Helminth Extracts.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 1/2, 70–75, 4 figs. on 2 pls.

The authors' experiments with laboratory animals on the effects of injecting extracts of *Ascaris megalocephala*, *Taenia saginata* and hydatid fluid show that both in regard to the localization and the nature of the lesions produced, the three substances have a homogeneous character. The respiratory organs, the liver and kidneys are always affected in degrees which vary with the nature of the substance and dosage employed. The *Taenia* extract produces signs of congestion, irritation and oedema and rarely, degeneration. The hydatid fluid is more toxic and gives rise to inflammation, not infrequently with degeneration and necrosis and also haemorrhage. The *Ascaris* extract is particularly toxic and produces inflammation, degeneration and haemorrhage. Although anaemia is not always present, hyper-leucocytosis, usually without eosinophilia, is a constant feature of the toxic effects. The lesions exhibit a marked analogy with those produced in guineapigs by administration of histamine.

J. J. C. Buckley

Newton, W. L., Bennett, H. J. & Figgat, W. B. **Observations on the Effects of various Sewage Treatment Processes upon Eggs of *Taenia saginata*.** *Amer. J. Hyg.* 1949, Mar., v. 49, No. 2, 166–75. [12 refs.]

" Experiments were set up for the evaluation of the effects of various sewage treatment processes upon eggs of *Taenia saginata*. The results and observations obtained before the limited supply of material was exhausted are presented.

" Twenty experiments were performed to observe the settling characteristics of *T. saginata* eggs in an 18-inch column of raw sewage. The settling rates obtained were as follows : 65 per cent. of the eggs, 0·6 inch per minute or faster ; 16 per cent., 0·3 to 0·6 inch per minute ; and 17 per cent., 0·15 to 0·3 inch per minute. These results indicate that sedimentation of raw sewage with moderate overflow rates and for 1-to-2-hour detention periods would remove the majority of the eggs. However, even under optimal conditions a significant percentage of influent eggs would escape the effluent.

" Seven experiments were conducted with the sand filtration process. A 12-inch column of sand, 0·5-millimeter effective size, was used. The filtration

rate was 1,000,000 gallons per acre per day, and influents contained 50,000 to 200,000 *T. saginata* eggs. The failure to recover eggs in the effluents, with one exception (0·4 per cent. recovery), at this extreme of operational conditions indicates that the process would be a very effective method of checking the spread of *Taenia* eggs in primary effluent.

" On the basis of the results obtained from two digesting sludge experiments still in progress, it would appear that this process is very slow in destroying *T. saginata* eggs. While there has been an obvious deterioration of many of the eggs, apparently normal eggs have been recovered from sludge after 6 months of digestion at 75° to 85°F.

" Two experiments were performed with a laboratory-model trickling filter operated at rather slow rates. Recoveries of 30 and 38 per cent. of influent eggs suggested that this process would not provide adequate protection against an effluent contaminated with *Taenia* eggs.

" One experiment with the activated sludge process still in progress indicates that this process would have little effect upon *T. saginata* eggs. After 5 months of aeration, there has been no noticeable effect upon the eggs as determined by microscopic examination.

" The results of these experiments indicate that, if sewage were contaminated with *Taenia saginata* eggs, the usual treatment processes (with the exception of sand filtration) could not be relied upon to produce effluent or sludge free of viable eggs."

Neghme R., A., Faiguenbaum A., J., Pilotti A., M. & Silva Campos, R. Algunos aspectos epidemiologicos de la hidatidosis humana en Chile. [**Some Epidemiological Features of Hydatid Disease in Man in Chile.**] *Rev. Chilena de Hig. y Med. Preventiva.* 1948, Dec., v. 10, No. 4, 197–207.

This study is based on the records of the 12 years, 1933–1944 inclusive. Though the actual number of cases of hydatid infestation has more than doubled—from 189 in 1933 to 399 in 1944–45 (in 1942 it reached 415)—and the ratio per 100,000 inhabitants has risen from 4·08 to 7·25 (7.91 in 1942), it is not certain that the numbers have really increased to anything like this extent; diagnosis is better and more hospital beds have been available so that the numbers of patients admitted for treatment of all diseases have risen. For estimating the geographical distribution the country has been divided into five zones: north, central, south, austral and " North Chile." Most cases occur in the central zone with the Provinces of Valparaiso, Santiago and Maule; it is agricultural and largely given up to cattle-raising. As regards sex distribution, male patients are slightly in excess of female, but the difference is not significant. The ages of 2,995 patients during the 12 years were ascertained and 1,407 (46·9 per cent.), were in the 20–39-year group, and 712 (23·7 per cent.) in the 40-59-year group, but there were 605 (20·2) in the second decade. The fatality rate has remained fairly stationary, except for a rise in 1941. The reduction since that year is ascribed partly to earlier diagnosis and partly to improved surgical technique. The chief cause of spread of infection is, as usual, the close connexion between dogs and cattle, some 30–38 per cent. of dogs around slaughter-houses being infested with *Echinococcus granulosus*.

H. Harold Scott

Queensland: Annual Report on the Health and Medical Services of the State of Queensland for the Year 1947–48. pp. 32–4. **Hookworm Campaign** [Thompson, S.].

In July 1947, the field hookworm campaign in Queensland was staffed by a microscopist, 3 residential sisters and a field inspector. There was close co-operation with the Weil's disease staff.

A large table gives detailed figures showing the topographical distribution of laboratory examinations and treatments. It is noted that 622 of 4,787 specimens were positive for hookworm: 320 of the infected persons have been treated to a cure. In all, 756 specimens contained other parasitic worms.

In each area inspected, arrangements were made with the local medical officers for 25 children under 3 years to be treated and observed in hospital. Of 1,977 school children, 88 harboured hookworm and 252 had other helminthic infections: 40 of the hookworm hosts have been treated to a cure.

Practical measures included spreading of lime on infected soil in the aboriginal reserve, inspection of sanitation at the homes of infected persons and close co-operation with medical, health, educational and mission authorities.

[References to co-operation with the staff of another campaign show evidence of an admirable spirit: but it is often to be asked, when health campaigns are undertaken in large and remote areas, whether multiplication of *ad hoc* survey or treatment teams is to be preferred to health teams with a broader mandate, equipped to deal with any of the local health problems as they are encountered.]

H. J. O'D. Burke-Gaffney

Floch, H. & Camain, R. Sur un nouveau cas de pseudo myiase rampante à *Ancylostoma brasiliense* en Guyane française. [**A New Case of Creeping Eruption due to** *Ancylostoma brasiliense* **in French Guiana.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 1/2, 29–33, 5 figs.

Observations were made upon a creeping eruption which appeared on the thigh of a male child of 3 months in French Guiana. The condition first appeared as a thread-like ridge which grew to about 1 centimetre long in two days. During the period, 25th July, 1947, to 30th August, 1947, the course of the track, which is illustrated by a drawing, was observed. Biopsy was then performed under a local anaesthetic, on the terminal part of the track, after which the condition cleared up and did not recur. Serial sections (15μ thick) of the excised piece of skin revealed a nematode 650μ long by about 20μ in width, in the dermis lying parallel to the skin surface. Reaction in the neighbourhood of the worm included dermal necrosis and cellular infiltration with monocytes and lymphocytes, but no eosinophilia was noted.

The parasite is armed at the anterior extremity with a strong pair of curved teeth, 4μ long by 3·5μ diameter at the base: 9μ posterior to these are two folds meeting in the middle line, which apparently represent a buccal capsule. Then follows an alimentary canal of 4μ to 6μ in width. On morphological grounds the parasite is tentatively identified as *A. braziliense*.

J. J. C. Buckley

de Oliveira, P. P. Estrongiloidose, problema sanitário. Incidência numa coletividade militar. (1.° G.A.C. Motorizado). [**Infestation by** *Strongyloides stercoralis* **a Sanitary Problem.**] *Hospital.* Rio de Janeiro. 1949, Mar., v. 35, No. 3, 437–43, 5 figs.

The author, an Army Medical Officer, examined the faeces of 299 recruits in the Province of Espirito Santo, using Baermann's method, and found the larvae of *Strongyloides stercoralis* in 82 of them (27·4 per cent.).

This helminth causes considerable disturbance—colic and diarrhoea, asthmatic attacks as the larvae pass through the lungs, blood changes of haemolysis, leucocytosis and eosinophilia. Considering that so many individuals who should be in good health, as recruits, harbour this parasite, the question is clearly one not only of medical but of public health concern.

H. Harold Scott

Baldwin, E. & Moyle, V. **A Contribution to the Physiology and Pharmacology of** *Ascaris lumbricoides* **from the Pig.** *Brit. J. Pharmacol. & Chemotherapy.* 1949, June, v. 4, No. 2, 145–52, 5 figs. [28 refs.]

[See also this *Bulletin*, 1948, v. 45, 921.]

Davenport, H. E. **The Haemoglobins of** *Ascaris lumbricoides*. *Proc. Roy. Soc.* Ser. B. 1949, June 23, v. 136, No. 883, 255–70, 7 figs. [21 refs.]

Davenport, H. E. *Ascaris* **Haemoglobin as an Indicator of the Oxygen produced by Isolated Chloroplasts.** *Proc. Roy. Soc.* Ser. B. 1949, June 23, v. 136, No. 883, 281–90, 4 figs.

Sprent, J. F. A. & Chen, H. H. **Immunological Studies in Mice infected with the Larvae of** *Ascaris lumbricoides*. **I. Criteria of Immunity and Immunizing Effect of Isolated Worm Tissues.** *J. Infect. Dis.* 1949, Mar.–Apr., v. 84, No. 2, 111–24, 13 figs. [25 refs.]

Féron, J. Sur le traitement de l'eléphantiasis des membres. [**The Treatment of Elephantiasis of the Limbs.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 3/4, 118–22, 3 figs.

The author claims that elephantiasis of the legs of streptococcal origin is rapidly cured by intramuscular injections of Rubiazol (a sulphonamide preparation) on three days a week, and intravenous injections at similar intervals of a solution composed of :—

Sodium thiosulphate 0·4 gm.
Magnesium thiosulphate 0·1 gm.
Distilled water 5 cc.

The latter method has been commercialized under the title of " desensitizing injection " and is thought to reinforce the action of Rubiazol ; this form of therapy can be supplemented by intravenous injections of iron and calcium gluconate.

The reduction of the swelling is aided by means of compression by an elastic bandage which clears away the oedema. This paper is illustrated by three photographs depicting the one case described. [The evidence is by no means convincing, as the elephantiasis is of moderate degree only and the diminution of the oedema could be attributed to compression by the elastic bandage.]

P. Manson-Bahr

Buckley, J. J. C. **Studies on Human Onchocerciasis and** *Simulium* **in Nyanza Province, Kenya. I. Distribution and Incidence of** *O. volvulus*. *J. Helminthology.* 1949, v. 23, Nos. 1/2, 1–24, 2 maps & 5 graphs. [11 refs.]

This paper is the first of a series which will describe an investigation into onchocerciasis and its vector *Simulium neavei* in the Nyanza Province of Kenya. Five foci of the disease were studied ; all lay in the altitude range of just below 5,000 feet to just below 6,000 feet. Onchocerciasis was absent in the low-lying plains and in the higher mountains. The five infected localities were Kodera, Riana (a focus discovered for the first time), Kuja River, Lumbwa and North Kavirondo. Preliminary surveys were undertaken in the first four by the taking of skin snips from members of the population. The author used the method he had devised for detecting *O. gibsoni* in the skin of cattle in Malaya. The skin is pinched up between the thumb and forefinger and a very

thin piece about 5 mm. in diameter is sliced off with a sharp razor. The skin snip is placed in a drop of saline on a slide, is allowed to stand a few minutes, and is then examined under a low magnification (× 230). The microfilariae are readily detected in the saline. No local anaesthetic is necessary and centrifugation need not be employed. The distribution of microfilariae in the skin of different parts of the body varies so enormously that quantitative estimations are useless ; in one case, there were two microfilariae in a skin snip from the thigh and 393 in another piece of similar size taken only 3 cm. away.

The incidence of the disease was then studied in detail, and observations were made on the ocular effects, cutaneous manifestations and abnormal skin conditions. The incidence in the population increased progressively with age, as the cumulative result of exposure to infection over a long period. Microfilariae probably first appear in the skin between the ages of 2 and 3 years ; children of this age in one locality showed a 19 per cent. infection rate, then from 5–7 years, 29 per cent. and 8–10 years, 34 per cent. In the young adults the rates rose to 55 per cent. and in the oldest age group to a maximum of nearly 80 per cent. In most localities men were more affected than women, probably because the men spend more time in surroundings infested with *Simulium* ; among the Kisii tribe, however, for a reason not understood, the women suffer more than the men. The effects of the disease in some of the highly infected areas are shown below.

(*Percentages*)

Place	Positive Skin Snips	Eye Lesions	Nodules	Abnormal Skin
Kodera ...	48	9	5	15
Riana ...	21	2	3	15
Lumbwa	29	2	3	9
N. Kavirondo	72	10	24	25

It was thought that the eye affections were probably much more common than these figures suggest ; many blind people remained in their houses. It was not always possible to assess the rôle played by *O. volvulus* in the causation of these affections—particularly the eye and skin manifestations.

The foci of the disease were always associated with the presence of *Simulium neavei*, the principal species to bite man in Kenya. The ecological requirements of this insect were clearly revealed ; fast-running rivers, a hilly terrain, well-wooded banks, and probably certain temperature requirements which tend to limit the species to altitudes well below 7,000 feet.

The survey embraced the examination of 5,842 Africans and is the most comprehensive of any yet reported from Kenya. Details are given of the incidence in the smaller localities, in mines, and elsewhere.

P. C. C. Garnham

Burch, T. A. **Experimental Therapy of Onchocerciasis with Suramin and Hetrazan.** *Bol. Oficina Sanitaria Panamericana.* 1949, Mar., v. 28, No. 3, 233–48. [12 refs.]

At a clinic established in an area of Guatemala where onchocerciasis is endemic, 182 patients were treated ; the report deals with 108 of these patients.

Fifty-six patients were treated with naphuride sodium (Suramin). In the first 12 cases, they were given intravenous doses of 0·02 gramme per kilo. body-weight, but the remainder were given only 0·5 gramme initially followed by 1·0 gramme weekly, for 5 to 7 weeks, a total dosage ranging from 0·31 to

0·07 gramme/kilo. Details of 46 patients are given, of which 43 showed microfilaria in skin biopsies before treatment. At the end of treatment 20 showed negative biopsies (at least four such), of which 13 were still negative at the end of 5–6 months. At the end of 7–8 months, of the 13 cases followed, 12 were negative : five of these had been positive at an earlier post-treatment stage but none of them later than 1–2 months.

The reactions were annoying and discouraged at least half the patients from continuing treatment until it was complete, but in none was it really necessary to discontinue ; these reactions, apparently due directly to the drug, were burning of the feet or palms and occasionally peeling or fissuring, muscle and joint pains, nausea, abdominal cramps, headaches, sleepiness and transitory swelling of the lips. Other reactions that were apparently due to the effect of the drug on the onchocerca were ocular reactions, pruritus, local induration, fever, and " peculiar feelings " inside the onchocerca lesions.

Fifty-two patients were treated with Hetrazan : of these 11 were given a total dosage of 20 to 46 mgm. per kilo. body-weight, with an initial dose of 0·5 mgm. per kilo. in 8 cases. Later, an initial dose of 0·1 mgm. per kilo. was given and the dose was increased gradually ; only three of the latter group received more than a total dose of 18 mgm. per kilo.

The effect of treatment was dramatic in the former group. Two patients showed no microfilariae throughout. Of the other 9, one only (20 mgm.) showed microfilariae at the end of treatment ; the rest were also negative after 1–2 months, but microfilariae returned in two cases at 3–4 months, in one case at 5–6 months and in two more at 7–8 months, so that only 3 of the original 9 microfilaria-positive cases remained free after 7–8 months, but another patient positive at 3–4 months became negative subsequently. Of the group receiving smaller doses, only 7 showed no return of microfilariae, but these were not followed for a sufficiently long time to make the observation important.

The side-effects with Hetrazan were more serious. In seven cases the course of treatment was modified or stopped on account of them, and many other patients refused to continue the drug. The side-effects included headache, general malaise, weakness, fainting spells and vertigo, abdominal cramps, aching pains in the joints and teeth, pruritus (in 43 cases), ocular reactions (in 22 cases), induration and oedema, papular eruption, and fever. These latter symptoms were, as in the case of Suramin treatment, attributed to foreign protein from killed worms.

The results of treatment with comparable doses of Hetrazan in *Wuchereria bancrofti* infection [Santiago-Stevenson *et al.*, this *Bulletin*, 1948, v. 45, 353] were not as good since only 1 out of 7 patients observed remained free from microfilariae after 7–8 months, but with larger doses, 75 to 135 mgm., 3 out of 4 were free from microfilariae after this period of observation.

L. E. Napier

Martínez Báez, M. Consideraciones sobre el examen de los nodulos oncocercosos en la investigación de la acción macrofilaricida de algunas drogas. [**Examination of *Onchocerca* Nodules in studying the Effect of Drugs on the Adult Worms.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1949, Mar., v. 10, No. 1, 17–27, 8 figs.

The success of Hetrazan in ridding the body of embryo of *O. volvulus* has been reported so often that it may now be taken as proved. As regards the action of the drug on adult worms opinion is not settled. Signs of degeneration in the worms have been noted and examination of nodules reveals scarce embryos—they may be absent altogether—and those present are sluggish, moribund or even dead.

In this article the author indicates how cautious we should be in interpreting these effects as due to the drug. He examined 300 nodules extirpated from supposed *Onchocerca* infections, fixing and staining the tissues in various ways. Twenty-one proved not to be *Onchocerca* nodules, but lymphatic glands, sebaceous cysts and the like ; 168 (56 per cent. of the total, 60 per cent. of the true *Onchocerca* nodules) contained adult worms. Some [proportion not stated] appeared normal, with eggs and embryos, others were more or less degenerated, with contorted, ill-defined outline and tissues necrotic or on the way to becoming so, with musculature fragmenting, in short all the signs which have been recorded as following the administration of Hetrazan, although the patients from whom these tumours had been taken had had no treatment. Another good example of the *post ergo propter* fallacy. *H. Harold Scott*

SANDOSHAM, A. A. **A Case of Human Gnathostomiasis in Malaya.** *J. Helminthology*. 1949, v. 23, Nos. 1/2, 71–2, 1 fig.

The first record of human gnathostomiasis in Malaya was made by SAMY [this *Bulletin*, 1919, v. 13, 213] : the case now recorded is the second from Malaya. The worm was removed from the pulp of a finger of a Chinese woman in 1947 : she had emigrated from China as a child and had lived near Ipoh for 29 years.

The worm presented at the advancing end of a raised linear track extending from a septic swelling over the nail bed. It appeared as a black object under the skin and had taken five days to travel from the dorsum of the finger to the pulp. Removal of the worm was followed by rapid healing. Morphological details of the worm are given and illustrated with line diagrams.

The author refers to previous records from Asia [this *Bulletin*, 1934, v. 31, 801 ; 1936, v. 33, 136 ; 1945, v. 42, 919]. Some of the Chinese in Malaya are given to eating raw freshwater fish and human gnathostomiasis may be commoner than has been suspected.

It was not possible to determine the species with certainty, but it is suggested that the specimen was a larval form of *Gnathostoma spinigerum*, which (with *G. hispidum*) has been recorded from domestic animals in Malaya.

H. J. O'D. Burke-Gaffney

EBERT, Carla. Oxyuren-Nachweis mittels Cellophanklebestreifen. [**Demonstration of *Enterobius* by the " Cellophane " Method.**] *Med. Klin.* 1949, Mat. 25, v. 44, No. 12, 375, 1 fig.

The author has modified the older method of making a smear preparation from " Cellophane " anal swab for recognition of *Enterobius* eggs. She attaches an adhesive " Cellophane " strip some 6 cm. long and 1·5 cm. broad in the anal cleft, presses it against the anus and leaves it overnight. The female worms come out, deposit their eggs and, in the morning when a smear is made on a slide, ova in large quantity and the worms themselves may be seen by low magnification. Of 250 children between the ages of 2 and 14 years examined thus, 217 (87 per cent.) were positive, whereas by the older smear method only 120 (48 per cent.) were positive. Another advantage is that the procedure can be carried out in the home by the mother and preparations can be kept for a week if necessary before being examined. *H. Harold Scott*

KETELSLEGERS, J. L'appendicite vermineuse par oxyures. [**Appendicitis from *Enterobius* Infestation.**] *Rev. Belge Sci. Méd.* 1946, Oct., v. 17, No. 5, 295–314, 7 figs. on 2 pls. [45 refs.]

In 1901, Metchnikoff first drew attention to the association between worm infections and appendicitis. Since this date there have been many reports

confirming this association ; the worms usually incriminated are *Ascaris lumbricoides*, *Trichuris trichiura* and *Enterobius vermicularis*.

In 28 appendices of children, eggs of one or more of these worms were found in 12 instances, and in 11 appendices of adults in 5 instances. *Enterobius* with or without other worms was present in 8 children and 2 adults.

A number of clinical histories are given together with pathological details of the removed appendices.

The conclusions at which the author arrives are :—that *Enterobius* undoubtedly plays an important rôle in the pathology of chronic and subacute appendicitis, and that in acute appendicitis it favours the action of the bacteria, especially in children ; that these worms invade the mucous membrane, causing erosions and ulcers, and enter Lieberkühn's glands and lymph follicles, disturbing the entire structure of the tissues and causing haemorrhages of varying degrees in the tissues invaded, and that, even in the absence of lesions, they leave traces of their presence in the tissues ; that, although the clinical diagnosis did not always correspond with the histological, on the whole the histological picture presented in the cases of acute and subacute appendicitis were distension of Lieberkühn's gland with mucus, hyperplasia and often an increase in lymph follicles, and simple hyperplasia of lymph glands ; and that in all cases where *Enterobius* was present there was distinct hypereosinophilia, especially in the areas of haemorrhagic infiltration. *L. E. Napier*

Schüffner, W. Kritische Beleuchtung der Oxyuriasis-Therapie und Winke für die praktische Ausführung. [**Critical Inquiry into the Treatment of *Enterobius* Infestation and Hints on Practice.**] *Med. Klin.* 1949, Mar. 18, v. 44, No. 11, 334–8. [15 refs.]

It is obvious that a cure of *Enterobius* infestation can be claimed only if the worms are cleared out and do not return, excluding, of course, re-infestation. The author has shown by human experiment that development may be slower than is generally thought, *viz.*, 14–35 days according to Heller, to 60 days according to Faust ; he found that as long as 93 days might lapse between ingestion of ova and appearance of fresh ova in the faeces from the developing worms ; the shortest interval was 37 days. Distinction is made between re-infection (or fresh infection) and retrograde infection or " retrofection " in which the larva develops after the egg is extruded and then crawls back into the anus and develops in the ordinary way. Early worms, *i.e.*, those seen in the first 37 days, may be either such as are resistant to the drug used (or the drug was given in too small a dose), or the drug, having acted on the adult gravid females, has no action on the younger immature forms and these develop normally ; or, thirdly, they may have hidden themselves in the appendix or in some spot where the drug has not reached them.

It has been said that 10–14 days after the treatment there should be an examination for ova and if they are found the course should be repeated. The author does not agree with this. One should bear in mind what he has stated above, that development of the worm may be slow and eggs passed later than the 14 days. Also ova from worms which had hidden in the appendix might appear later and would be no proof that the drug was ineffectual, as it would have acted only on those worms which were accessible to it. Daily search for ova is necessary for gauging the results of treatment, and only when there are definite indications that the course has failed should it be repeated or another drug be tried. Quoting from the literature the author mentions several drugs which have been recommended—oil of chenopodium, gentian violet, crystal violet, phenothiazine and others. Preventive measures must vary according to the method of infection, whether this be digital transference,

indirect contact by eggs on food, retrofection and dust infection ; but all such measures may be summed up in cleanly habits, washing of hands and " anal toilet ".

H. Harold Scott

NEGHME, A. **Present Status of Trichinosis in Santiago, Chile.** *J. Parasitology.* 1949, Apr., v. 35, No. 2, 136–7.

Between 1938–48 small familial epidemics of trichinosis have occurred in the province of Santiago, Chile, where some 50 human cases occur annually. In 1944, autopsy of diaphragm muscle from 296 persons dying in Santiago hospital revealed the presence of trichinae in 12·5 per cent. Although the disease is endemic in Chile, it is mostly benign and mortality in recognized cases is very low. The author illustrates this by reference to an outbreak described by him and his collaborators from a Military School in Santiago in 1947 [this *Bulletin*, 1948, v. 45, 356].

In the same year, 157 acute cases of trichinosis were found in Santiago between July and October : a month before the epidemic began, many hogs had been slaughtered and a transient shortage of beef at that time had led to an increased consumption of pork.

Surveys in the municipal slaughterhouse revealed an incidence of trichinae among hogs of 0·2 to 0·3 per cent., the highest being in animals raised in garbage lots. Microscopic inspection of slaughtered hogs for trichinae is compulsory in Chile, but a survey of 52 slaughterhouses in Santiago province suggest that this was being done as a routine measure in only five establishments.

New regulations were introduced in 1947, whereby hogs shall be slaughtered only in slaughterhouses where microscopic examinations for trichinae are carried out as a routine : eight specimens of muscle from each hog must be examined : the raising of hogs in garbage lots and feeding them with uncooked garbage are prohibited. In connexion with this, it was found that 5 per cent. of 822 hogs in one garbage lot harboured the parasite, as did 8 per cent. of 200 rats trapped on the same premises.

While the author agrees with GOULD [this *Bulletin*, 1946, v. 43, 578] that processing pork is the most effective method of controlling trichinosis, such measures are not feasible in Santiago at present. Reliance must therefore be placed on the new regulations and on education of the public. It is added that microscopical inspection, especially with the phototrichinoscope, has not proved to be so expensive in Chile as it has been reported to be in other countries.

H. J. O'D. Burke-Gaffney

NEGHME R., A., HOECKER S., G. & FELNER P., Eva. Incidencia de Triquinosis en las ratas de basural y su posible relación con el grado de infestación de los cerdos criados en el mismo sitio. [**Incidence of Trichinosis in Rats from Garbage and its possible relationship to Pigs reared in the same Place.**] *Rev. Chilena de Hig. y Med. Preventiva.* 1948, Dec., v. 10, No. 4, 209–12.

The English summary appended to the paper is as follows :—

" The authors have examined 200 rats trapped in a garbage-lot of Santiago, Chile, and found 8% infected with *Trichinella spiralis*.

" They discuss the relationship between this finding and the high incidence of Trichinosis (5·1%) found in 822 hogs reared in the same place."

DEFICIENCY DISEASES

Wood, I. J., Garlick, H. W., Motteram, R., Weiden, S., Moore, A., Mackay, M. & Turner, C. N. **Nutritional Disease of the Liver.** *Med. J. Australia.* 1949, Apr. 23, v. 1, No. 17, 541–7, 1 fig. [25 refs.]

The occurrence of fatty infiltration of the liver and its development through periportal fibrosis to Laennec cirrhosis as a result of malnutrition, particularly protein deficiency, has been frequently described in recent years. The studies of early cases have been made largely in children and the end results in adults have been increasingly recognized.

The authors describe the development of nutritional disease of the liver in eighteen adult patients. The commonest cause of the malnutrition was chronic alcoholism, but in a minority of cases the causes included other organic diseases, dietetic obsessions, poverty, or a solitary existence. The later results of the condition have been long known, but attributed primarily to alcholism ; the importance of malnutrition as the main causative factor has been insufficiently recognized. The cases were studied clinically and biochemically and material for histological study was obtained by aspiration biopsy of the liver.

The main clinical manifestations of nutritional liver disease were lassitude, mental depression, muscular weakness, and failure of memory and concentration, with anorexia, nausea and morning vomiting. Jaundice was occasionally seen and haematemesis was not uncommon, especially in the advanced cases. The liver was usually enlarged, and vascular changes included dilatation of superficial veins, blood-shot eyes and occasional scattered spider naevi. Associated manifestations of vitamin deficiency included peripheral neuritis, petechial haemorrhages, atrophy of the tongue and angular stomatitis. A reliable dietetic history was difficult to obtain from the alcoholic patients, but persevering inquiry revealed the true aetiology of the condition.

Biochemical investigations showed that liver function tests (serum bilirubin, cephalin flocculation, hippuric acid excretion, urine urobilinogen, alkaline phosphatase) give results within normal limits in early cases, but are a reliable guide to prognosis in more advanced cases. [The bromsulphthalein clearance test, regarded by some workers as the most sensitive liver function test in this type of condition (Waterlow, this *Bulletin*, 1948, v. 45, 724) was not done.] Total plasma protein was usually low and there was marked inversion of the albumin/globulin ratio. Liver biopsy showed, in different individuals, the progress from fatty infiltration to portal cirrhosis, and was also useful in establishing diagnosis and prognosis.

Treatment consisted mainly in the giving of a liberal well-balanced diet rich in protein and vitamins. The advantage of adding lipotropic substances such as choline is still doubtful. It is of the greatest importance that intercurrent infection should be controlled and toxic substances such as alcohol must be withdrawn. In the fatty phase of this disease the condition is apparently completely reversible, the prognosis being progressively worse as the amount of fibrosis increases, but even in advanced cases with established portal cirrhosis a suitable régime may retard or arrest the downward trend. *Dean A. Smith*

Strangway, W. E. & Strangway, Alice K. **Ascorbic Acid Deficiency in the African Disease Onyalai.** *Arch. Intern. Med.* 1949, Apr., v. 83, No. 4, 372–6, 1 fig.

Onyalai is a form of thrombopenic purpura, of hitherto unknown aetiology, described in many parts of Africa and characterized by the formation of

haemorrhagic bullae on mucous membranes, haemorrhages from the intestinal and urinary tracts and a high mortality. Of 150 patients suffering from onyalai admitted to a hospital in Angola up to 1940, 90 per cent. died.

Dietary investigation of patients in the area of Angola concerned, revealed a very low intake of ascorbic acid, especially during the hungry season when the incidence of onyalai is at its highest. Accordingly, treatment with large doses of lemon juice, pure ascorbic acid not being available, was tried and proved effective. The amounts given were large, ranging from 2 to 20 litres, and recovery within a few days occurred in all but one of 43 patients. When synthetic ascorbic acid became available it proved equally effective, the total dosage varying from 2 to 8 gm. Intravenous administration was necessary in severe cases, and 9 out of 10 patients recovered within seven days.

These findings strongly indicate that onyalai is due to dietary ascorbic acid deficiency. One observation, however, throws doubt on this as the complete explanation of the aetiology of the disease. In three untreated patients ascorbic acid excretion in the urine was found to be between 50 and 100 mgm. per 24 hours, a rate of excretion greater than that of normal Africans. It may be postulated that, while a low ascorbic acid intake is a predisposing condition, the onset of the disease is determined by excessive excretion, with consequent rapid tissue depletion, by some toxic mechanism. This hypothesis gains some support from the very high dosage necessary to achieve a cure, a dosage much in excess of that needed for the treatment of scurvy. [See also RIGBY below, p. 873.]

Dean A. Smith

SPRUE

KEELE, K. D. **The Prognosis and Treatment of Sprue in India.** *Brit. Med. J.* 1949, June 4, 986–9, 1 chart.

In a clinical survey of 600 cases of sprue during the recent war it was ascertained that only 31 per cent. had reached the stage of complete remission of the disease before evacuation from India. The object of the present paper is to assess the prognosis and results of treatment of 62 others in the follow-up period of two years in England, so that the value of methods of treatment at that time employed may be judged in perspective. In general, cases were treated, on admission, by diet alone. When this failed, the patient was given " an investigation diet " from which therapeutic substances, such as liver, were omitted. With this diet it was possible to assess the effect of parenteral liver, nicotinic acid and riboflavin. Cases which responded satisfactorily to diet were classified as mild sprue : those which failed to do so as severe sprue.

Criteria of progress (short term) were assessed by appearance of signs of the remission phase. These constituted ; gain in weight, cessation of diarrhoea ; steatorrhoea and abdominal distension were the last signs to disappear. Criteria of complete remission were restoration of weight to within 10 lb. of normal, stools normal in number, colour and fat content and absence of abdominal distension. Criteria of long term progress (after 2 years) were based (1) upon complete fitness since return from India, (2) loss of time from work with symptoms suggestive of sprue or any other disease, and (3) necessity for hospital treatment.

For dietetic treatment the short-term (3 months) results are shown for 52 patients treated initially with diet alone by means of the Napier 3, 4, 5 high-protein low-fat sprue diets ranging from 1,513 to 2,584 Calories and containing

1·2–1·6 mgm. thiamine, 6·0–6·3 mgm. riboflavin, 18·3–26·9 mgm. nicotinic acid and 31–43 mgm. ascorbic acid. Thirty-seven patients were evacuated to England after three months' treatment, 23 in a state of complete and 14 of partial remission. The remaining 15 failed to respond to treatment.

The long term (2 years) results show that during two years, 29 have been in complete remission, four have periodically developed symptoms and four have definitely relapsed and have been admitted to hospital.

The results of short term (6 months) parenteral therapy were seen in 25 patients, 15 who had failed to respond to dietetic treatment and 10 too ill on admission to be treated on diet alone. All these received investigation diets, but without foods with possible therapeutic value, such as liver, bananas and vitamins. They received parenteral liver over long periods and some were given trials of injections of nicotinic acid and riboflavin for a short time. All were treated for six months before evacuation from India. Ten were in complete remission, 13 in partial, and 2 failed to respond.

Of the 62 patients 69·4 per cent. have remained well for two years in England and 8 per cent. have had mild gastro-intestinal symptoms : 16·1 per cent. have relapsed since leaving hospital in India.

The cyclic evolution of the disease should be appreciated, and a glossitis lasting 2–3 weeks early in remission has an obvious bearing on assessing the efficacy of any therapeutic agent. Liver therapy is dramatic and may be life-saving, but has no detectable action during remission.

Of 52 patients treated by diet alone, 71 per cent. underwent remission. Fifteen who failed to improve were deprived of liver, bananas, and vitamin extracts for a period up to 12 days without any deterioration in their condition.

In 10 undergoing remission during liver therapy, a positive nitrogen balance was found. In one of these a negative nitrogen balance had been present during relapse. During relapse also absorption of fat still remained in the region of 50 per cent. Raising the fat intake from 69 to 96 gm. daily did not alter the percentage absorbed. The evidence of the glucose-tolerance curve is doubtful. This was flat in relapse and remained so for the first two weeks of remission. Nicotinic acid and riboflavin produced no change in fat absorption nor in the clinical state.

In one severe relapse, the effect of 10–15 gm. of sodium chloride daily by the mouth was tried for 10 days. Fluid stools rose from 3 to 9 a day, weight dropped, anorexia increased and weakness became extreme. Serum sodium rose from 258 mgm. to 310 mgm. per 100 ml.

Sulphaguanidine (as in bacillary dysentery) improved the diarrhoea, often within 24 hours. The danger of dehydration was rapidly overcome. As it did not produce remission of symptoms its usefulness lay solely in controlling diarrhoea. The mode of action of liver in sprue is not clear. The extract used was a crude one of Indian manufacture and was equivalent to a standard proprietary preparation as regards haemopoietic activity. Dosage was 10 ml. given intramuscularly each day for 4 days followed by 4 ml. daily for some weeks.

The effects of liver depend on the phase of the sprue cycle. It is active and beneficial in relapse, but affords little benefit in remission. The more marked the relapse syndrome the more effective was liver therapy, but its action was not proportional to the severity of the anaemia. Gastric hydrochloric acid was increased under liver therapy, while the stools, though pale, became normal in number and consistency within 3–7 days. Reticulocytosis was slight (not above 3 per cent.), but the red cell count slowly rose over a period of weeks with steady diminution in the mean corpuscular volume to normal.

The action of liver manifested itself in the gastro-intestinal tract from tongue to colon, producing evidence of increased absorption of water and water

soluble-substances, but no such marked effect was seen in fat absorption. The haemopoietic response was slow and unlike that produced in pernicious anaemia.

P. Manson-Bahr

HAEMATOLOGY

FONSECA, L. C. Subnutrição e anemia na região noroeste do estado de São Paulo. (Sobre a importância das carências alimentares na patogenia das anemias com especial referência à ancilostomótica.) [**Malnutrition and Anaemia in the North-Western Region of São Paulo (Brazil). (On the Importance of Dietary Deficiency in the Pathogenesis of Anaemia, with special reference to Hookworm Anaemia.**)] *Hospital.* Rio de Janeiro. 1948, Apr., v. 33, No. 4, 559–610, 6 figs. [125 refs.]

A haematological investigation was made in 212 unselected recruits from the interior of São Paulo, Brazil. The men were divided into groups, according to their previous dietary background. The results are summarized in the following table :—

Diet	No. of cases per cent.	Mean R.B.C. millions per cmm.	Haemoglobin gm./100 ml.	Mean Corpuscular Haemoglobin, γγ
Very good ...	1	4·64	14·48	31
Good ...	19·8	4·69	14·62	31
Average ...	20·2	4·37	13·28	30
Bad ...	38·2	4·20	12·64	29·7
Very bad ...	20·8	4·07	11·91	29·2

If anaemia is considered to be present when the red cell count falls below 4 million, or the haemoglobin below 14 gm./100 ml., then 70 per cent. of the recruits were anaemic. The incidence in the general population is likely to be even greater, since the group studied was composed of apparently fit young men.

The author goes on to discuss the part played by iron-deficiency and by ankylostomiasis in causing this high incidence of anaemia. He recapitulates in detail the work of W. Oswaldo CRUZ, who in 1932 [this *Bulletin*, 1932, v. 29, 760] put forward the hypothesis that the essential cause of hookworm anaemia is an inadequate iron intake, and that only a secondary rôle is to be attributed to the blood-sucking activities of the parasite. This view received some support from the findings of RHOADS, CASTLE, PAYNE and LAWSON in Porto Rico [*ibid.*, 1935, v. 32, 263].

In subsequent papers [*ibid.*, 1934, v. 31, 797 ; 1935, v. 32, 262, 640] Cruz showed that the so-called hookworm anaemia as seen in Brazil, is intensely microcytic and hypochromic, with an average mean corpuscular volume of 56 cuμ and a mean corpuscular haemoglobin of 13γγ. On treatment with iron alone, without vermifuges, the red cell indices are rapidly restored to normal. This response is accompanied by a reticulocytosis of up to 30 per cent., which may cause a transient macrocytosis [compare LEHMANN, this *Bulletin*, 1949, v. 46, 664]. Vermifuges, on the other hand, have quite a different effect : they may cause an increase in the red cell count, but have no effect on the red cell indices, and do not produce signs of blood regeneration.

On Cruz's theory, ankylostomiasis is to a large extent irrelevant as a cause of anaemia, such as that found in São Paulo. Fonseca in the main accepts this view: he attaches, however, rather more importance to the hookworm as a cause of blood loss, and thereby loss not only of iron but perhaps also of other nutrients, such as vitamins and protein. The paper concludes with an examination of the public health aspects of the problem, and with a plea for more attention to be given to the nutritional status of the Brazilian people.

J. C. Waterlow

PATEL, J. C. & BHENDE, Y. M. **"Refined" Liver Extract in Tropical Macrocytic Anemia.** *Blood.* 1949, Mar., v. 4, No. 3, 259–68. [17 refs.]

Forty-five patients with tropical macrocytic anaemia (T.M.A.) were treated with "refined" liver extracts, Anahaemin, Examen, Reticulogen, and Examen N.P. (new potency). All had a red cell count below 3·0 million per cmm. The patients were in hospital on a milk or vegetable diet.

In four patients on Anahaemin an optimum response was obtained after 2 ml. repeated weekly for 4 weeks, 12 ml. in 6 days, 9 ml. in 10 days, and 20 ml. in 10 days, respectively; in one of these cases no response was observed after the first 2 ml.

With Reticulogen, no response was obtained in one case with 4 ml. in 8 days, but optimal response in another on 8 ml. in 8 days.

With Examen, an optimal response was obtained in a series of cases with divided doses of 8 ml., 12 ml., 14 ml., 14 ml., 22 ml., 22 ml., 26 ml., and 32 ml., a sub-optimal response with 4 ml. (single dose), and no response or poor response to 10 and 20 ml. (divided) but both the latter failed to respond normally to "crude" liver extract.

With Examen N.P., an optimal response was obtained with divided doses of 12 ml., 10 ml., 6 ml. (in 7 cases), and 3 ml. (in 4 cases) and with single doses of 2 ml. (in 5 cases) and 1 ml. (1 case). A sub-optimal response was obtained with 1 ml. (1 case) and 2 ml. (4 cases). No response was obtained with 3 ml., 2 ml., and 5 ml. (in 1 case each), but in the two latter cases no response was obtained with crude liver extract either.

The authors conclude that, as in the case of pernicious anaemia, the response in tropical macrocytic anaemia, or in nutritional macrocytic anaemia of temperate climates, which they consider the same syndrome, to liver extracts, "refined" or "crude," is in proportion to the amount of liver from which the extract was made. But they consider that there is evidence that the newer refined extracts contain some substance that was not included in the earlier preparations, and that this accounts for discrepancies in the observations of some previous workers.

They also conclude "As judged from therapeutic observations, it is suggested that in the majority of cases of T.M.A. the deficiency is similar to that in Addisonian pernicious anaemia, though the mode of production of the deficiency may not be the same."

L. E. Napier

SPIES, T. D., GARCIA LOPEZ, G., MILANES, F., LOPEZ TOCA, R. & ARAMBURU, T. **A Note on the Oral versus Parenteral Administration of Vitamin B_{12}.** *Southern Med. J.* 1949, June, v. 42, No. 6, 528–31, 2 charts.

The authors refer to their paper on the tentative appraisal of vitamin B_{12} as a therapeutic agent [this *Bulletin*, 1949, v. 46, 566]. They confirm their observations on the response to B_{12} of cases of pernicious anaemia, tropical sprue and nutritional macrocytic anaemia (four of each, all in relapse), and they point out that while oral administration is highly satisfactory, parenteral

injections will be indicated in many cases. There are advantages in the use of this route in cases where there is severe cardiac failure, severe neurological changes or severe gastro-intestinal disturbances. The patient will absorb the material administered parenterally and a deranged tract cannot act as a block to its absorption.

While there is considerable variation in response, the patients in the authors' group can be said to have taken from 30 to 50 times as much material by mouth as by injection : this amount is reduced to about 5 to 10 times the parenteral dose by the oral administration of an incubated mixture of vitamin B_{12} and normal human gastric juice. Two patients with pernicious anaemia are referred to who developed " acute combined system disease " after 30 microgrammes of B_{12} by the mouth : when the same quantity was incubated with human gastric juice and given to the patients the blood responded and the " acute signs of combined system disease " disappeared. *H. J. O'D. Burke-Gaffney*

Itano, H. A. & Pauling, L. **A Rapid Diagnostic Test for Sickle Cell Anaemia.** *Blood.* 1949, Jan., v. 4, No. 1, 66–8. [14 refs.]

In sickle-cell anaemia, the erythrocyte maintains its normal shape in the presence of sufficient oxygen, but when the oxygen tension is reduced the haemoglobin aggregates into clumps, the cell membrane collapses, and the erythrocyte takes on an oat or sickle shape.

The authors' method of testing blood for this sickling tendency is based on the fact that sodium dithionite ($Na_2S_2O_4$) reduces oxyhaemoglobin.

The reagent is prepared by adding 0·114 M aqueous sodium phosphate (NA_2HPO_4) to 0·114 M aqueous sodium dithionite until the *p*H is 6·8 ; the ratio of the two solutions required for this purpose is about 3 to 2. The reagent should be prepared shortly before use. About 0·05 ml. is added to a small drop (about 0·01 ml.) of blood on a slide (either oxalated or finger blood) and the mixture is observed under the microscope, or an excess of reagent may be added to a small volume of blood in a test-tube and a drop of the mixture observed under the microscope. The process of sickling may also be followed in a haemocytometer counting chamber by half filling it with a saline suspension of the red cells and then adding the reagent to fill the chamber.

The authors tested the blood in six cases of sickle-cell anaemia and noted characteristic changes. They assume that the sickling will also occur with the blood of a person with the sickle-cell trait only ; but their tests in this investigation were confined to cases of declared anaemia. *L. E. Napier*

Cornbleet, T., Schorr, H. C. & Barsky, S. **Pseudo-Ophiasis and Sickle Cell Anemia.** *Arch. Dermat. & Syph.* 1949, May, v. 59, No. 5, 519–21.

" All 3 patients were male, but their ages ranged from 5 to 25 years. All had severe sickle cell anemia. It appears that the alopecia, once formed, remains indefinitely. It does, however, vary in degree, the variation paralleling the changing severity of the subject's anemia. The alopecia could be thought of as an inverse hippocratic one. It would have been desirable to make a histologic study of material from the scalp, but this material was not forthcoming. The alopecia is apparently not a family characteristic. How it is produced is pure conjecture."

EPIDEMIC DROPSY

SINGH, B. M. **A Study of Clinical Features of Acute Cardiac Failure in Epidemic Dropsy.** *J. Indian Med. Ass.* 1949, Feb., v. 18, No. 5, 158–60.

At Bhagalpur epidemic dropsy occurred in 1939–40 and thereafter sporadic cases only were observed till the beginning of 1947 when they became more frequent and reached an acme in the second quarter of the year. The cause was shown to be mustard oil contaminated by argemone oil. In this short paper particular reference is made to 12 patients (out of 50 studied) who presented symptoms of acute cardiac failure. No organic valvular lesions were detected, no ascites and no cyanosis until just before death ; no marked dropsy was present. The condition is very serious, with marked dyspnoea, respirations 50–60 per minute, pulse 120–130 ; a posture of orthopnoea was preferred although it did not seem to afford any relief. In two patients the attack was brief, lasting 2–4 hours only, in one it lasted for 48 hours ; the remaining nine died after symptoms increasing in severity. [Nothing is said of the post-mortem appearances ; perhaps no autopsy was held.] *H. Harold Scott*

VENOMS AND ANTIVENENES

CORKILL, N. L. **Malnutrition and Snake Poisoning in the Sudan.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, May, v. 42, No. 6, 613–16, 1 graph.

The author states that in the Anglo-Egyptian Sudan there are two seasons of the year when human beings suffer from nutrition deficiencies : the early rains (May–July) when milk and green food are scarce, and the winter (November to mid-February) when latent deficiencies tend to became overt. The period of heavy rain is July–October.

Snakes are most numerous at the height of the rains and, naturally, cases of snake-bite are then more common, but figures show that fatalities from this cause are more frequent in the dry season when snakes are relatively fewer. It is suggested that " in the dry season persons are in a nutritionally poorer state than they are in the wet season when milk and vegetables are plentiful, and the superimposed snake poisoning—apart from the synergistic haemorrhagic effect of viperine venom with ascorbin deficiency—serves through trauma as a pressor episode, *i.e.*, as a stimulant to katabolism, and thus tends to activate nutrient deficiency conditions, thereby increasing the illness of the bitten person."

The common belief in the annual recurrence of symptoms is ascribed analogously to the annual season of deficiency. *H. Harold Scott*

TAYLOR, E. H. **A Preliminary Account of the Herpetology of the State of San Luis Potosí, México.** *Univ. Kansas Sci. Bull.* 1949, Apr. 20, v. 33, Pt. 1, 169–215.

ROCHA E SILVA, M., BERALDO, W. T. & ROSENFELD, G. **Bradykinin, a Hypotensive and Smooth Muscle Stimulating Factor released from Plasma Globulin by Snake Venoms and by Trypsin.** *Amer. J. Physiol.* 1949, Feb. 1, v. 156, No. 2, 261–73, 8 figs. [31 refs.]

" The pseudo-globulin fraction (precipitated by 30 to 45% saturation with ammonium sulphate) of normal plasma contains the precursor (bradykininogen) of a hypotensive and smooth muscle stimulating factor (bradykinin) that can be

released by proteolytic and coagulating venoms of the *Bothrops* genus and by trypsin. If an appropriate dose of the enzyme or the venom is used, the maximum release is observed after 1 to 3 minutes incubation, at 37°. If incubation of the globulin with the venom of *B. jararaca* or trypsin is prolonged for 10 to 20 minutes the released factor is destroyed ; this suggests that it has a polypeptide nature or at least a peptide linkage, the integrity of which is necessary for its pharmacological activity.

" Bradykinin is thermostable, dialysable through cellophane, resistant to prolonged boiling in 0·1 to 1.ON HCl solution, but rapidly destroyed if heated in an alkaline solution.

" The guinea pig gut is the most sensitive smooth muscle organ assayed and the rat intestine the least so. Doses of bradykinin equivalent to those released from 100 to 200 cc. of plasma produce a steady fall in arterial blood pressure of the cat, the rabbit and the dog. The possibility that bradykinin is a mediator in several kinds of shock is discussed."

AHUJA, M. L. & BROOKS, A. G. **Detoxification of Krait Venom *in vivo* by means of Carbolic Soap Solution.** *Indian J. Med. Res.* 1948, Apr., v. 36, No. 2, 181–2.

The senior author refers to previous work by himself and BROOKS [this *Bulletin*, 1946, v. 43, 478] in India and that of CHRISTENSEN and DE WAAL [*ibid.*, 1948, v. 45, 108] in South Africa on the protective effect of soap solution in pigeons and guineapigs respectively given certain lethal doses of cobra venom.

The note records the protective effect of soap solution infiltrated into the thigh muscles of guineapigs 1 to 3 minutes after that area had been injected with venom of the common krait (*Bungarus caeruleus*).

A table shows how the survival time was extended by the administration of soap solution after doses of krait venom of 0·06 to 0·02 mgm., compared with corresponding doses when no treatment was given. For example, with 0·02 mgm. of venom, 4 guineapigs died in 5 to 8 hours respectively, while with soap treatment and the same dose of venom, 3 out of 4 animals survived and the fourth did not die for 30 hours. *H. J. O'D. Burke-Gaffney*

EFRATI, P. **Poisoning by Scorpion Stings in Israel.** *Amer. J. Trop. Med.* 1949, Mar., v. 29, No. 2, 249–57. [15 refs.]

The author has, during the 12 years 1935–1947 seen a large number of cases of scorpion sting, but in 22 only did generalized toxic signs appear and his remarks in this paper are based on these. The common scorpions of Palestine are : *Buthus quinquestriatus* (the most poisonous), *Prionurus bicolor*, *Nebo hierichonticus*, *Buthus judaicus* and *Scorpio maurus* ; one of the patients was stung by *P. crassicauda* ; in ten other cases in which the scorpion was identified it proved to be *B. quinquestriatus* ; all the severe cases and all that ended fatally were the result of stings by this species. The systemic symptoms which came on 10–20 minutes after the stinging were usually restlessness, laboured respiration, cyanosis, vomiting, flushing of the face, rhinorrhoea, chilliness and tachypnoea, sometimes formication, tachycardia and abdominal pain.

Six of the 22 patients died ; serum was obtainable in a few instances only, so treatment was chiefly symptomatic. Five received serum prepared at the Pasteur Institute, Algiers ; one died—the amount of serum being insufficient—whereas of 17 who did not receive it 5 died. Atropine and Gynergen [this is not defined] were given to 5 patients ; two seemed to improve, but in three no benefit was observed. [Nothing can be inferred from this because many of those stung get well without treatment.] *H. Harold Scott*

SERGENT, Et. Douze années de sérothérapie antiscorpionique. [**Twelve Years' Use of Scorpion Antivenin.**] *Ann. Inst. Pasteur.* 1949, Jan., v. 76, No. 1, 50–52.

The antivenin used is that prepared by inoculation of horses with the venom or anavenom of *Prionurus australis*, the most toxic of North-African scorpions [see this *Bulletin*, 1949, v. 46, 775]. This is active against the venoms of other scorpions in this district. Thus, the author records the case of a boy of 6 years, stung by a *Buthus occitanus* ; he became comatose in a few minutes but rapidly revived when given a subcutaneous injection of 20 cc. of *P. australis* antivenin. The preparation was made available to medical practitioners in 1936 and in the next 12 years observations had been sent in on 4,057 patients treated by the antivenin. Among these, 1,003 were so serious as, in the opinion of the medical attendants, to threaten life, and of these, 923 (92 per cent.) recovered ; 24 were Europeans, the rest (97·5 per cent.) were indigenous Moslems. *H. Harold Scott*

DERMATOLOGY AND FUNGUS DISEASES

DOSTROVSKY, A. & SAGHER, R. **Lichen Planus in Subtropical Countries. Study of an Annular Type with Inverse Localization (Uncovered Surfaces of the Skin).** *Arch. Dermat. & Syph.* 1949, Mar., v. 59, No. 3, 308–28, 3 figs. [Refs. in footnotes.]

During the years 1930 to 1946 a total of 131 cases of lichen planus were treated at the outpatient department of the Rothschild-Hadassah University Hospital, Jerusalem. This figure represents approximately 0·2 per cent. of all patients with dermatological disease.

In 51 cases a special type of lichen planus was observed. Morphologically this appeared in an annular pattern mainly confined to the exposed parts. The eruption had a special predilection for the lower age groups, and affected particularly persons of dark complexion coming from subtropical countries. It differed from classical lichen planus in that itching was almost entirely absent. The onset was seasonal with recurrences or spreading in spring and summer and improvement in the rainy season. It ran a longer course than classical lichen planus, and usually lasted several years. Grenz rays were used in the treatment of 18 patients, in 10 of these the lesions disappeared, and in 3 there was some improvement. *H. T. H. Wilson*

LIMA TORRES, A. Treponemose discrómica. Purú-purú, mal de pinto. [**Dyschromic Treponematosis. Mal del Pinto.**] *Rev. Brasileira Med.* Rio de Janeiro. 1949, Feb., v. 6, No. 2, 111–21, 1 chart. [32 refs.]

This paper was presented for reading to the Public Health Society of Brazil. It covers the subject of pinta generally, with many quotations from or allusions to the literature of the disease. The author proposes the name of *dyschromic treponematosis* caused by *Treponema carateum* and he divides his essay into three parts : epidemiology, prophylaxis and legislation. Much of it is text-book knowledge today. He starts with a list of the synonyms in Brazil, Colombia, Mexico, Haiti and elsewhere, and follows this with a definition of the disease and a sketch of the history of the discovery of the cause from the early " mycosis " days to the later " spirochaete," and the various names given to the organism, *T. carateum, T. herrejoni, T. americanum, T. pictor, T. pintae* and *T. dyschromoderma*, deciding that the first is the correct one, given by

Brumpt in 1930. The geographical distribution and transmission are next dealt with. Modes of transmission referred to are: 1. Direct, by contact. 2. Indirect by (i) vectors, *Hippelates and Simulium*; (ii) Ritual means, mutual flagellation, the whips being contaminated by the blood of some infective person transferred to the wounds of a non-infected; (iii) Criminal [surely unlikely] where "rowers and interpreters" who object to newcomers inoculate the latter with infective blood or give them such blood mingled with their food, when their mouths are sore from eating some irritating food; (iv) Other modes mentioned are infection of an infant by its mother's milk, and transmission by blood-transfusion. Hereditary transmission is also mentioned, but the author states that the evidence for this is lacking.

The section on Prophylaxis contains nothing fresh; it includes search for cases, diagnosis by serum reactions and finding the organism, treatment by mercury, arsenicals and penicillin, and protection of the healthy by good sanitation, healthier and better dwellings and propaganda work by instituting sanitation posts for the treatment of patients by spreading information about the disease and educating the people. The third section on Legislation is closely connected with the second and includes penalties for violation of the rules of hygiene. *H. Harold Scott*

Moreau, M. H. Un caso de pie de Mádura. **[A Case of Madura Foot.]** *Prensa Méd. Argentina.* 1949, Feb. 4, v. 36, No. 5, 230–32, 4 figs.

Bras, G., Rijkebüsch, Liesbeth, Kotter, G. F. & Ham, D. L. Een klinische, pathologische en mycologische waarneming bij Histoplasmose. **[Clinical, Pathological and Mycological Observations on Histoplasmosis.]** *Med. Maandblad.* Batavia. 1949, May 1, v. 2, No. 5, 146–52, 8 figs. on 2 pls. [36 refs.] English summary.

A fatal case in a Chinese in Batavia, with general clinical and pathological observations.

Cancela Freijo, J. Histoplasmosis de Darling. Segundo caso observado en el Uruguay. **[A Second Case of Histoplasmosis observed in Uruguay.]** *Hoja Tisiológica.* Montevideo. 1947, Sept., v. 7, No. 3, 207–11, 7 figs.

Report of a case in Montevideo.

Campbell, Charlotte C. & Saslaw, S. **Use of Yeast-phase Antigens in a Complement Fixation Test for Histoplasmosis. III. Preliminary Results with Human Sera.** *Pub. Health Rep.* Wash. 1949, May 6, v. 64, No. 18, 551–60. [11 refs.]

In a previous paper by these authors [this *Bulletin*, 1949, v. 46, 83] on the complement-fixation reaction with anti-*Histoplasma* rabbit serum and various forms of *Histoplasma* antigen, it was shown that the most suitable antigen for the test was a suspension of the ground-up yeast-like form of the fungus. This kind of antigen was therefore used in the complement-fixation tests with human serum which were designed to determine the probable value of the complement-fixation reaction in the serological diagnosis of histoplasmosis; to find if the degree of dermal sensitivity to histoplasmin was proportionate to the titre of complement-fixing serum antibody, and to determine to what extent the specific value of the complement-fixation test for the diagnosis of histoplasmosis was vitiated by cross reactions with the antigens of *Blastomyces dermatitidis*.

In three cases of acute histoplasmosis, the serum titres for complement-fixation ranged from 1 : 320 to 1 : 1,280, but as the disease progressed towards the chronic stage, these titres declined and approached the level of those given by normal sera.

Of the normal sera examined, 40 per cent. gave complement-fixation in titre from 1 : 10 to 1 : 40. Low titre complement-fixation was given by the sera of 10 out of 73 persons who were histoplasmin-positive and by 6 out of 134 who were histoplasmin-negative. It was found that the proportion of apparently non-specific serum reactions was greatly reduced by allowing only 4 hours instead of the customary 18 hours for antibody-antigen combination in the cold, before adding the complement. Cross reactions with *Blastomyces* antigen occurred and, as previously observed, they were more marked between anti-*Histoplasma* serum and *Blastomyces* antigen than between anti-*Blastomyces* serum (which was invariably of low antibody content) and *Histoplasma* antigen.

From the results quoted, the authors concluded that the potential value of the complement-fixation test as an aid in the diagnosis of histoplasmosis has been demonstrated. *J. T. Duncan*

Saslaw, S. & Campbell, Charlotte C. **A Collodion Agglutination Test for Histoplasmosis.** *Pub. Health Rep.* Wash. 1949, Apr. 1, v. 64, No. 13, 424–9.

In an earlier paper, Saslaw & Campbell [this *Bulletin*, 1949, v. 46, 779] described the reaction of agglutination, by anti-histoplasma serum, of a suspension of collodion particles sensitized with the soluble antigens of *Histoplasma capsulatum*. The present report deals with the application of this serological reaction as a diagnostic test for human histoplasmosis.

The sera of 197 healthy persons, 71 of whom were histoplasmin-positive, were tested with the sensitized suspension and 60 were found to cause relatively weak agglutination. Of these 60, 25 were in the histoplasmin-positive group and 35 in the histoplasmin-negative group. So the apparently non-specific agglutination reaction was not related to dermal sensitivity to histoplasmin.

Tests with sera from six proved cases of histoplasmosis, showed three, all from chronic stages of the disease, to possess weak agglutinating power similar to that of the normal sera, but the remaining three, all from acute disease, showed much stronger reactions and higher agglutinin titres. With these six human sera, the results of the collodion agglutination tests were closely correlated to those of specific complement-fixation tests, and it was felt that further research may show that the agglutination of sensitized collodion particles constitutes a simple and useful diagnostic test in histoplasmosis. *J. T. Duncan*

Firestone, G. M. & Benson, E. S. **Coexisting Disseminated Coccidioidomycosis and Tuberculosis.** *Amer. Rev. Tuberculosis.* 1949, Apr., v. 59, No. 4, 415–28, 4 figs. [11 refs.]

" A case of disseminated coccidioidomycosis which lasted for six years and was complicated by active tuberculosis is presented. The two diseases seemed to occur coincidentally, the individual coccidioidal granulomas being devoid of acid-fast bacilli, and the tubercles containing only a few *Coccidioides* spherules at the periphery. The coccidioidomycosis terminated in a miliary dissemination throughout the body, including the brain and prostate, as well as the more usual sites, but did not involve the bowel or renal pelves. The tuberculosis presented a definite ' secondary ' or ' adult ' type of distribution in the lungs, pharynx, and bowel, as well as a hematogenous dissemination to the seminal vesicles.

" Streptomycin was of definite value in controlling the tuberculosis but did not affect the coccidioidomycosis, whereas potassium iodide and vitamin D_2 in massive doses seemed to decrease some manifestations of the coccidioidomycosis. It is suggested that the latter drugs be given further trial in cutaneous coccidioidomycosis."

HEAT STROKE AND ALLIED CONDITIONS

LADELL, W. S. S. **The Effect of Pituitrin upon Performance in Moderate Heat.** *South African J. Med. Sci.* 1948, Oct., v. 13, No. 4, 145–50, 1 fig.

During work in humid heat there is probably some release of anti-diuretic principle from the pituitary, and this paper reports preliminary observations on the effect of pituitrin on performance in the heat. The subjects were eight young African medical students, none of whom had been outside Nigeria. The experimental room was maintained at about 88°F. dry-bulb and 83°F. wet-bulb, with calm air. In each experiment there were four 30-min. spells of step-climbing on to a stool 1 ft. high 24 times a minute, with 15-minute intervals of rest. Weighings were done, and sweat losses thus ascertained.

Each subject was tested four times, twice without and twice with pituitrin (5 units given subcutaneously). The pituitrin decreased the sweat production of the heavy sweaters and increased that of the light sweaters so that after pituitrin the two groups lost similar amounts of sweat.

This statistically significant difference could not be accounted for with any certainty, but there is a very brief discussion of a possible explanation.

Thomas Bedford

MISCELLANEOUS DISEASES

LÖFFLER, W., ESSELIER, A. F. & MACEDO, M. M. Sobre a patogenia e etiologia do infiltrado pulmonar fugaz com eosinofilia sanguínea. (Síndroma de Löffler). [**The Pathogeny and Aetiology of Loeffler's Syndrome.**] *Gaz. Méd. Portuguesa.* 1949, v. 2, No. 1, 1–16, 10 figs. (8 coloured) & 1 folding chart. [15 refs.] English summary.

The coincident presence of eosinophilia and transient pulmonary infiltration has been accounted for in various ways. The authors have shown by experiments on guineapigs, infesting them with larva-containing ova of *Ascaris lumbricoides*, that the results were patches of atelectasis ; and evanescent pulmonary changes with eosinophilia ; and by sacrificing the animals at intervals he has demonstrated the larvae and eosinophilia in the lungs. The coloured plates of the stained sections are particularly good. [This article cannot be said to add very much to our knowledge of Loeffler's syndrome. All that the authors have shown is that *Ascaris* larvae in passing through the lungs set up transitory changes there associated with eosinophilia—facts well known in the life-history of this helminth.]

H. Harold Scott

JAFFÉ, L. **Scleroma (Rhinoscleroma).** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, May, v. 42, No. 6, 617–19. [11 refs.]

The author writing from Almirante, Panama, prefers the less restricted term scleroma to that of rhinoscleroma because the disease is by no means limited to the nose. The case here described supports his view. The patient was a man of 24 years whose nostrils were almost closed by crusted scar-like tissue, with granulations on the right vocal cord and thickening of the subglottic mucosa. The report by the pathologist on tissue from the nostrils was that it was a typical rhinoscleroma. Treatment by sulphathiazole was tried, then by fouadin (reprodal) intramuscularly, and tartar emetic intravenously, and surgical symptomatic local measures, but with little and not lasting benefit. After 15 months of this, he is to apply elsewhere for X-ray or radium treatment.

Rhinoscleroma is believed by some to have autochthonous foci only in Central America, Sumatra, and in South-eastern Europe in Volhynia and Galicia. It is, however, not uncommon in Guatemala and El Salvador, and the author saw cases of it in Honduras. The results of the various forms of treatment suggested and tried are variable and uncertain.

H. Harold Scott

DE LA RIVA, G. E. **Contribution to the Study of Tropical Eosinophilia.** *Southern Med. J.* 1949, May, v. 42, No. 5, 429–34. [27 refs.]

Early in 1949 an epidemic of fever and eosinophilia involving about 3,000 cases occurred in Pinar del Rio in the Western province of Cuba. Writing from Havana, the author describes his investigations on a group of 43 of these cases. Thirty-one of them he regarded as parasitic infections with no positive findings except for a moderate eosinophilia. These recovered completely after parasiticidal therapy. Eight cases were regarded as examples of Loeffler's syndrome on account of their marked pulmonary consolidations, high eosinophilia, and rapid recovery. The remaining four cases in this group were regarded by the author as examples of tropical eosinophilia. All four showed asthmatic symptoms, leucocytosis and eosinophilia, and in all cercariae of *Fasciola hepatica* were isolated from bile samples. Three other cases exhibiting respiratory symptoms and a high degree of eosinophilia were also regarded by the author as classical examples of tropical eosinophilia. Surgical removal of a congenitally atrophic testicle in the first case, of retained products of conception in the second, and of a dermoid cyst in the third was followed by complete recovery in each case. The author accordingly is of the opinion that tropical eosinophilia is not a specific disease, but is an allergic response of an organism to embryonic elements of any nature which act as allergens with specific antibody production.

[The author has demonstrated that respiratory dyspnoea and eosinophilia may follow a variety of causes. In each of the seven cases which he describes a reasonable explanation is given to account for the symptoms and the eosinophilia. It is therefore doubtful whether these cases are identical with those described by WEINGARTEN [this *Bulletin*, 1943, v. 40, 407] and subsequent writers who have failed to demonstrate similar findings after investigating a very large number of cases of classical tropical eosinophilia.]

H. T. H. Wilson

WEINBAUM, J. G., RIBLET, Lillian & BENEDICT, C. D. **Tropical Eosinophilia.** *Bull. U.S. Army Med. Dept.* 1949, June, v. 9, No. 6, 477–83, 2 figs. [Refs. in footnotes.]

Report of a case in a U.S. soldier from Korea.

RIGBY, E. P. **A Case of Secondary Thrombocytopoenia resembling Onyalai.** *East African Med. J.* 1949, Apr., v. 26, No. 4, 84–6.

Onyalai has rarely been reported from East Africa, and only once from Kenya (WELCH, *J. Trop. Med. & Hyg.*, 1920, v. 23, 138). The case described below was probably of secondary origin.

The patient, an adult Meru male, was admitted to hospital with a swollen and painful right knee. Kahn test on 18th October 1948 showed ++++. Three injections of bismuth [preparation and dose not stated] were given, but this was stopped owing to development of a mild gingivitis. Subsequently four injections of 0·45 gm. arsphenamine were given, the last on 25th November 1948. On 1st December the patient began to bleed from the gums, which showed no sponginess, but two haemorrhagic bullae were found on the tongue, one on the dorsum and one underneath. On 3rd December he was still bleeding and a third bulla, showing umbilication, had developed on the lower lip. Two ampoules of Planavit were given and three injections of the patient's own citrated whole blood, two of 20 ml. and one of 16 ml., were administered intramuscularly. Bleeding finally ceased on 5th December when the red cell count was 3,830,000 per cmm.; the bleeding did not recur. A successful platelet count was not done.

On 19th January 1949 the Kahn test was negative and on 27th January an injection of 0·3 gm. of arsphenamine was given without recurrence of the bleeding.

This is the first time that the author has seen an onyalai type of disease associated with the administration of arsenicals. GELFAND [this *Bulletin*, 1949, v. 46, 573] points out that this condition is found only in certain Bantu tribes, and the author suggests that its occurrence may be due to a personal idiosyncrasy, tribal in extent. The patient was of the same tribe as the only case previously reported in Kenya by Welch.

[Probably some cases are missed or confused with other diseases.]

C. F. Shelton

HUGHES, M. **A Case of Thromboangiitis Obliterans in an African Woman.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, May, v. 42, No. 6, 621–2. [10 refs.]

Thrombo-angiitis obliterans (Buerger's disease) is very uncommon in women, and the author has not been able to find any record of its occurrence in a negress. He now reports a case in an African woman of the Northern Territories of the Gold Coast, a heavy tobacco smoker who also chewed tobacco, who came to hospital for treatment for a chronic ulcer of the foot. Signs of gangrene appeared after local operation, and the author eventually amputated the limb 10 inches below the anterior superior iliac spine. The stump healed by first intention, and the patient, previously in bad condition, immediately and dramatically improved.

Pathological examination of the limb showed appearances typical of Buerger's disease; the association with tobacco is noted. No Kahn test was done, but had it been positive it might have been the result of yaws.

Charles Wilcocks

DAVIES, J. N. P. **Pathology of Central African Natives. Mulago Hospital Post Mortem Studies, X.** *East African Med. J.* 1949, Apr., v. 26, No. 4, 76–83. [10 refs.]

The author groups renal disease into two main groups: (1) those in which there is a gross alteration in the anatomy of the kidney, *e.g.* hydronephrosis,

tumour, etc.; (2) those terminating in a granular scarred kidney, often containing cysts, and generally referred to as nephritis. Renal affections due to bilharzia are uncommon in Kampala, Uganda, unlike GELFAND's experience in Rhodesia. The clinical assessment of nephritis is most difficult, malnutrition oedema is common and can closely simulate a nephrotic syndrome. At autopsy the picture is often obscured by other lesions, while the microscopic diagnosis is difficult. Nearly every kidney removed shows hyalinized glomeruli, even in the case of young children, but the incidence of arteriosclerotic nephritis appears low.

Of 2,994 autopsies at Mulago, 301 cases were diagnosed as having some form of nephritis, of which 210 were put down as "unclassified," this group being made up of those where no histological examination was made and of those where signs both of diffuse glomerulotubular nephritis and proliferative glomerulitis were found. The majority of deaths occur in the younger age groups, and the commonest immediate causes of death in Africans with nephritis were supervening infections, especially pneumonia. Very little is known about this condition in Africans, and, with the exception of Henessey's work in 1939 [this *Bulletin*, 1939, v. 36, 949], no detailed investigation appears to have been carried out.

Abnormalities of the kidney were studied at 3,375 autopsies. Primary renal agenesia is a very rare condition and no bilateral cases have been seen. There were only 4 cases of unilateral agenesia and dwarfed kidney and these lesions are less common in Africans than in Caucasians. Horseshoe kidney was found 3 times and in one such case numerous renal calculi were present. Solitary cysts were seen twice. No cases of bilharzial urinary infection were seen. In Uganda far the commonest cause of obstruction in the urinary tract is urethral stricture. Renal calculus is uncommon in Africans (at Mulago 11 cases in 2,294 autopsies). The commonest renal tumour was a secondary lympho-sarcoma.

The commonest bladder condition was cystitis with hypertrophy, due to gonococcal stricture. Tumours of the bladder and prostate have been discussed in a previous paper in the series. It is noted that the problem of urethral stricture is an immense one and treatment difficult, as patients come late for treatment when infective and obstructive symptoms are usually well-established. Uro-genital tuberculosis of the fibro-caseous type is uncommon and renal tuberculosis almost always of the miliary type. *C. F. Shelton*

GREENWALD, I. **The History of Goitre in Africa.** *Bull. History of Med.* 1949, Mar.–Apr., v. 23, No. 2, 155–85. [Bibliography.]

PROTOZOOLOGY: GENERAL

HELLBRÜGGE, T. Ueber Toxoplasmose. [**On Toxoplasmosis.**] *Deut. med. Woch.* 1949, Apr. 1, v. 74, No. 13, 385–9, 4 figs. [27 refs.]

The author describes a case with symptoms of toxoplasmosis in a child who was under his care in Munich. The account is preceded by a lengthy review of the present state of our knowledge of this disease and of the parasite.

When admitted to the hospital, the patient, a child 3½ years old, showed signs of post-encephalitis, being mentally and physically underdeveloped, with sialorrhoea. X-ray examination of the cranium revealed two calcified spots, while examination of the eyes showed the characteristic lesions of chorioretinitis

pigmentosa. The condition was thought to be congenital toxoplasmosis, the diagnosis of which was supported by a positive neutralization test with the child's serum, while the results of a similar test with the mother's serum were less pronounced. Since the mother has been breeding rabbits for some years, it is thought that she contracted the infection from them, transmitting it to the child during its foetal development. *C. A. Hoare*

EDMONDS, A. R. **Human Toxoplasmosis, with Report of a Case.** *Med. J. Australia.* 1949, Apr. 2, v. 1, No. 14, 456–7.

A fatal case in a female infant in Perth, Australia.

BLANC, G. & HINTERMANN, J. Un cas de toxoplasmose canine observé au Maroc. Grande réceptivité du *Xerus getulus* à l'infection expérimentale. **[A Case of Canine Toxaplasmosis in Morocco. High Susceptibility of *Xerus getulus* to Experimental Infection.]** *Arch. Inst. Pasteur du Maroc.* 1949, v. 3, No. 10, 618–21. [14 refs.]

LANGHAM, R. F. **Canine Toxoplasmosis.** *Amer. J. Path.* 1949, May, v. 25, No. 3, 569–73, 4 figs. on pl.

"An acutely fatal disease in a dog was characterized by pneumonitis, gastric and intestinal ulcers, and foci of hepatic necrosis. The parasites found in the microscopic sections had the structure and distribution described for *Toxoplasma cunicula*."

DE RODANICHE, Enid & DE PINZON, Teresina. **Spontaneous Toxoplasmosis in the Guinea-Pig in Panama.** *J. Parasitology.* 1949, Apr., v. 35, No. 2, 152–4, 6 figs. on pl. [12 refs.]

"Spontaneous infection with toxoplasma was observed in guinea-pigs purchased in the suburbs of the city of Panama, and representing stock established in this area and without contact with recently imported members of their species."

EICHENWALD, H. **Experimental Toxoplasmosis. II. Effect of Sulfadiazine and Antiserum on Congenital Toxoplasmosis in Mice.** *Proc. Soc. Exper. Biol. & Med.* 1949, May, v. 71, No. 1, 45–9. [15 refs.]

"The effect of sulfadiazine, antiserum and a combination of these two materials on the course of congenital toxoplasmosis in mice was determined. It was shown that while sulfadiazine and antiserum individually had some beneficial action, a combination of these substances was considerably more effective than either used alone."

ENTOMOLOGY AND INSECTICIDES: GENERAL

ZUMPT, F. **Medical and Veterinary Importance of Horse-Flies.** *South African Med. J.* 1949, May 7, v. 23, No. 19, 359–62. [37 refs.]

The author, reviewing the literature on the rôle of *Tabanus*, *Haematopota* and *Chrysops* as vectors of disease, expresses the view that their capacity to disseminate certain disease organisms to man and animals, particularly mechanically as a result of interrupted feeding, has been underestimated in the past. In

this light, the literature on the mechanical transmission of trypanosomiasis (*Trypanosoma evansi*, *T. brucei*, *T. vivax* and *T. congolense*), anthrax, tularaemia, haemorrhagic septicaemia of buffaloes in the Dutch East Indies, anaplasmosis, and infectious anaemia (swamp fever) of horses, is discussed and a plea is put forward for further study on the epidemiological importance of Tabanids (and of *Stomoxys*) in the spread of these diseases. *D. S. Bertram*

MATTINGLY, P. F. **Notes on a Collection of Mosquitoes (Diptera : Culicidae) from Ruanda Urundi.** *Ann. Soc. Belge de Méd. Trop.* 1949, Mar. 31, v. 29. No. 1, 29–35.

A list is given of 11 species of anopheline and of 32 culicine mosquitoes collected in Ruanda-Urundi during July to September 1946. A detailed locality list is also given. Two species not hitherto recorded from this territory are *Anopheles dureni* and *Culex cinereus*. *H. S. Leeson*

VAN DER KUYP, E. **Annotated List of Mosquitoes of the Netherlands Antilles including French St. Martin with a Note on *Eutriatoma maculata* on Curaçao and Bonaire.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1949, Mar., v. 1, No. 1, 69–70.

" Sixteen species of mosquitoes of which one is an Anopheles, and *Eutriatoma maculata* Erichson are reported from the Netherlands Antilles ; also 4 species of mosquitoes from French St. Martin."

SENEVET, G., GAUD, J. & MILLET, A. Validité de l'espèce *Culex mauritanicus* Callot, 1940. **[Validity of the Species *Culex mauritanicus*, Callot, 1940.]** *Ann. Inst. Pasteur d'Algérie.* 1949, Mar., v. 27, No. 1, 42–7, 1 fig.

SENEVET, G. Le genre Culex en Afrique du Nord. 2. Les armures génitales mâles. **[The Genus *Culex* in North Africa. 2. Male Hypopygia.]** *Arch. Inst. Pasteur d'Algérie.* 1949, Mar., v. 27. No. 1, 48–65, 9 figs. [11 refs.]

The male hypopygia are described and illustrated of thirteen species of mosquitoes of the genus *Culex*, occurring in North Africa. A key based on these characters is given for their identification. *H. S. Leeson*

SABROSKY, C. W. **On the Distribution and Correct Name of *Oscinis pallipes*, the Swarming Gnat of the Sudan.** *Bull. Entom. Res.* 1949, May, v. 40, Pt. 1, 61–2.

THURMAN, D. C., Jr., MULRENNAN, J. A. & THURMAN, Ernestine B. **Occurrence of *Phlebotomus* (*Neophlebotomus*) *shannoni* Dyar in Florida (Diptera, Psychodidae).** *J. Parasitology.* 1949, Apr., v. 35, No. 2, 199–200.

VARGAS, L. & DÍAZ NÁJERA, A. Nuevas especies de simulidos de Mexico y consideraciones diversas sobre especies ya descritas. **[Observations on New Species of Simulidae in Mexico.]** *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1948, Dec., v. 9, No. 4, 321–69, 63 figs. on 12 pls.

DELPY, L. P. Révision par des voies expérimentales du genre *Hyalomma* C. L. Koch 1844 (2e partie). **[Experimental Revision of the Genus *Hyalomma*.]** *Ann. Parasit. Humaine et Comparée.* 1949, v. 24, Nos. 1/2, 97–109, 2 pls. [12 refs.]

[See this *Bulletin*, 1946, v. 43, 1080.]

WYGODZINSKY, P. Elenco sistematico de los Reduviiformes americanos. **[Systematic Index of American Reduviid Forms.]** *Universidad Nacional de Tucuman: Instituto de Medicina Regional. Publicación No. 473.* 1949, Feb., Monografia No. 1. 102 pp. [Bibliography.]

This includes lists of Triatomids of medical importance.

JENKINS, D. W. **Trombiculid Mites affecting Man. III.** *Trombicula* (*Eutrombicula*) *splendens* **Ewing in North America.** *J. Parasitology.* 1949, Apr., v. 35, No. 2, 201–3, 4 figs. on pl.

The trombiculid larvae causing trombidiosis in North America are *Trombicula alfreddugèsi* and *T. splendens*, and in the tropical and sub-tropical areas of the United States *T. batatas* and *T. alfreddugèsi tropica* are also of local importance. The adults of *T. splendens* were first described in 1913, but until the present work was undertaken the larval form had not been related to the adult. The author shows, by breeding out material, that the trombiculid larva formerly known as *Acariscus masoni* is indistinguishable from the larva obtained from *T. splendens* adults. *D. S. Bertram*

DE MEILLON, B. **Eradication of the Vectors of Insect-borne Diseases of Man.** *J. Roy. San. Inst.* 1949, May, v. 69, No. 3, 177–83.

An informative review including Brazil, Egypt, Cyprus, Sardinia and Kenya.

PIEDROLA GIL, G. Las modernas series de insecticidas y ahuyentadores. Revisión de conjunto. **[Review of Modern Insecticides and Repellents.]** *Med. Colonial.* Madrid. 1949, May 1, v. 13, No. 5, 362–82. [21 refs.]

A general review.

CHOPRA, B. L. **D.D.T. An Ideal Insecticide and Larvicide.** *Indian Med. Gaz.* 1949, Mar., v. 84, No. 3, 111–13.

A short general review of nature and special application of DDT.

JOHNSTONE, H. F., WINSCHE, W. E. & SMITH, L. W. **The Dispersion and Deposition of Aerosols.** *Chem. Reviews.* 1949, Apr., v. 44, No. 2, 353–71, 8 figs.

[This paper is entirely theoretical and highly mathematical: it presents no new data but compares some conclusions with data of other workers.]

From certain assumptions on the conditions governing deposition of aerosol particles out of doors, some predictions can be made about the optimum particle size for various purposes. For example, when aerosol falls down through foliage while there is a gentle cross-wind, less of the larger particles will be impacted on leaves than the smaller particles. On the other hand, if the aerosol is thrust down by a downdraught from the aeroplane, the opposite is true.

For aerosols in confined spaces it can be calculated that there is an optimum particle size for producing various percentages of mortality. The relations between particle size and wind velocity and mortality are also discussed, and the theoretical relationship is shown to agree well with experimental results obtained elsewhere. *J. R. Busvine*

LA MER, V. K. & HOCHBERG, S. **The Laws of Deposition and the Effectiveness of Insecticidal Aerosols.** *Chem. Reviews.* 1949, Apr., v. 44, No. 2, 341–52, 5 figs. [15 refs.]

Laboratory experiments were done with an apparatus designed to give aerosol particles of constant, determinable size. The relation of particle diameter to insecticidal action was assessed by the concentration-time product for

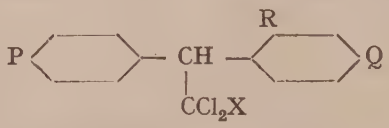
exposures of mosquitoes to DDT aerosols. It was shown that the logarithm of this function is inversely proportional to the logarithm of the droplet radius (over the range 0·3 to 5 microns). In some tests with a wind tunnel, mosquitoes in cages were exposed to aerosols drawn past them at different speeds. The quantity of DDT, per area of cross-section of the tunnel, necessary to give 50 per cent. kill of *Aëdes aegypti*, was determined for various combinations of particle size and wind velocity. The logarithm of this quantity was found to be inversely proportional to the logarithm of the product of the square of the diameter and the wind velocity.

This is due to the mosquitoes picking up more and more poison as the wind velocity increases and also as the diameter (and therefore liability to impaction) of the particles increases. The relationship falls off above a certain point where the mosquito begins to pick up *all* the particles approaching it in its area of cross section. This value appears to be about 700 micron-miles per hour, which indicates an optimum particle size of 10 microns. [Apparently assuming an air velocity of 7 m.p.h.].

In outdoor use, the logarithm of the quantity of aerosol falling on standard areas is shown to be inversely proportional to the distance away from the point of generation. Some practical examples are quoted, in which a mobile generator was used, to show that adequate kills of larvae and adult mosquitoes in different areas up to 800 or 1,000 yards away can be achieved by output of an aerosol at the rate of 34 lb. DDT per mile, provided that correct particle size is chosen. *J. R. Busvine*

PEFFLY, R. L. & GAHAN, J. B. **Residual Toxicity of DDT Analogs and related Chlorinated Hydrocarbons to House Flies and Mosquitoes.** *J. Econom. Entom.* 1949, Feb., v. 42, No. 1, 113–16.

Laboratory tests were done to determine the toxicity to *Aëdes aegypti* and to *Musca domestica* of a number of DDT analogues used as residual insecticides. Several of the best were used for extended tests, though none of them was as good as DDT. One of the best samples was " DDT by-product oils," a mixture of unknown composition. Other comparative results may be indicated by a key, as follows : A=best persistent action, B, C, D=least efficient. Thus :—



Where :— R	Q	P	X		Known as	Effective grade against *Aëdes*	Effective grade against *Musca*
H	Cl	Cl	Cl	...	DDT	A	A
Cl	H	Cl	Cl	...	*O.p*-DDT	C	D
H	Cl	Cl	H	...	DDD	C	C
H	F	F	Cl	...	*fluoro*-DDT	C	D
H	Br	Br	Cl	...	*bromo*-DDT	D	B
H	CH_3O	CH_3O	Cl	...	*methoxy*-DDT	B	C
H	CH_3	CH_3	Cl	...	—	B	C
H	H	Cl	Cl	...	—	B	D

[This code is assessed by percentage kills, given after various intervals, in the authors' tables.] *J. R. Busvine*

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

Ross Institute Industrial Advisory Committee [Wigglesworth, A., Chairman]. London School of Hygiene and Tropical Medicine. Information and Advisory Service. 1949, May, No. 1, 12 pp. **Residual Insecticides.**

This is the first of a series of Bulletins to be issued by the Ross Institute Industrial Advisory Committee.

In a foreword to the Bulletin by the Organizing Secretary, it is stated that the bulletins will deal with one or two important subjects and also will contain news and comments by the Director on the latest developments in tropical medicine and recent activities of the Ross Institute. Usually the main subject will be one of those diseases which are important in the daily work of the planter or miner.

This number deals with residual insecticides, their nature, use, indications and economics. In brief but adequate form, and yet with considerable practical detail, the subject is dealt with in a manner which gives a wealth of information which the intelligent layman will be able to grasp and pursue with ease. DDT and benzene hexachloride are dealt with separately and they are described effectively for the purpose for which the Bulletin is intended.

This series of Bulletins, having the weight of authority and the reputation of the Ross Institute behind them, should prove to be invaluable for those engaged in industry and management in the tropics.

H. J. O'D. Burke-Gaffney

Macgregor, R. B. **Medical History of the War in Malaya.** *Med. J. Malaya.* 1949, Mar., v. 3, No. 3/145–72.

This is a graphic account of the medical situation in Malaya from the beginning, in 1939, of serious preparations to resist invasion, up to the re-occupation in 1945. It is compiled from the reports of many medical officers and traces the story of medical services during the war, retreat, and siege, the decay of Public Health services during the Japanese occupation and the eventful history of the civilian internees. Many of the purely medical details, particularly in regard to nutrition, have already received notice in this *Bulletin*. As a vivid and entirely unbiased description of this unhappy phase of Malaya's history it will be read with the greatest interest. *Dean A. Smith*

Hance, B. **The Development of Western Medicine in India.** *J. Trop. Med. & Hyg.* 1949, Apr., v. 52, No. 4, 79–82.

The history of western medicine in India goes back to the Islamic conquest which spread from Persia to India, and brought the teachings of the great Arab physicians to displace the Ayurvedic system. The latter, though at its zenith (7th–5th centuries B.C.) it was based upon observation and experiment, had long been decadent when the Islamic invasion took place, but the new system in its turn fell into a decline. The first European physician known to have practised in India was a Portuguese who lived in Goa, where he published a book in 1563. Sir Bennett Hance records the outstanding events in the Medical history of India since that time, in so far as they relate to the development of western medical ideas there, in this short paper, which should be read in full.

The effort expended during the past hundred years or so to educate Indians in medicine has been impressive, and there are now 19 medical colleges teaching to degree standard, and 19 medical schools of licentiate standard. Together

these admit some 2,200 students each year, and there are 50,000 registered practitioners now working in the population of 400,000,000. This proportion is, of course, much below the ratio in Britain, but there are signs that steps to increase it will be taken. *Charles Wilcocks*

India. **Indian Institute of Science 1938–1948.** pp. xii+139, 32 pls. 1948. Bangalore 3 (South India). [Re. 1.]

It is stated that this handbook has been issued as a special volume on the occasion of the visit to the Institute of the Hon. Pandit Nehru, Prime Minister of India.

It gives an impressive account of much work covering a wide range of subjects in chemistry, engineering, metallurgy and social services and contains some interesting photographs of the Institute and its activities.

The only chapter of direct interest to readers of this *Bulletin* is a brief one of three pages which lists the work undertaken in the field of pharmacology. This includes analysis of the quality and potency of drugs which include sulphonamides, organic arsenicals, antimalarials and glandular extracts; research on immunity and nutrition; investigation of antibiotics, including study of various indigenous drugs and moulds: chemotherapeutic investigation of various arsenic and antimony compounds on lizard filaria; and chemotherapy of some acridine derivatives on fowl malaria. It is stated that "antimalarial drugs of the paludrine type and some with sulpha-combination" are being tested in fowl malaria. *H. J. O'D. Burke-Gaffney*

González Rivera, M. Diez años de trabajo en el Instituto de Salubridad y Enfermedades Tropicales. [**Ten Years Work of the Institute of Hygiene and Tropical Diseases, Mexico.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1949, Mar., v. 10, No. 1, 3–16.

Lopez-Monis, C. Aspectos de la lucha sanitaria en Guinea. [**Some Points of the Sanitation in Guinea.**] *Med. Colonial.* Madrid. 1949, May 1, v. 13, No. 5, 399–410.

At the suggestion of the Director-General of the Colonial Service the author tells of diseases common in Guinea and Fernando Pó. The information given is in very general terms and will be of greater interest to those who like to hear of places they have not seen than to those who work in warm climates to whom the subjects referred to are familiar. Reference is made to leprosy, formerly —20 years ago—more common than now; to dysentery, ankylostomiasis, malaria, trypanosomiasis, yellow fever and tropical ulcer which, says the author, is fast disappearing as nutrition is improved. Figures are not given but merely vague statements as, *e.g.* sleeping sickness, common 20 years ago, is now rarely seen; that yellow fever is quite rare, no case having been seen for the past 7 years, although there was a small epidemic outbreak on the adjacent coast. [An immunity survey should prove an interesting investigation.] A leprosarium is to be erected at Mikomeseng in the northern district for interning all those attacked. Ankylostomiasis is rife; the author sketches the life-history of this nematode. Malaria remains the chief disease, but the type, the prevalence and methods of dealing with it are omitted altogether, though the elementary facts of its mosquito transmission and the symptoms are described. [The title is not quite correct; the information is mostly clinical and general and remarks about sanitation and campaign against the diseases are almost entirely lacking.] *H. Harold Scott*

BOOK REVIEWS

ECKSTEIN, Albert. **Malaria im Kindesalter.** [Malaria in Children.] pp. viii+ 119, 18 charts & 48 figs. on 11 pls. 1946. Basle & New York : S. Karger.

This book deals with the general problems of malaria in children and includes a good deal of practical information which the author has derived from ten years' experience as a children's doctor in Turkey.

In his introduction the author refers to the unsatisfactory text-book descriptions of malaria in children. He regards malaria in children as a disease in itself differing in many ways from the disease in the adult ; the younger the child the more unlike the adult disease is the malaria. Malaria in hyper-endemic regions may be regarded as a children's disease ; in slightly endemic areas, it is rather a disease of adults.

The introduction is followed by a short section on prophylaxis of the disease in children, dealing with the chemotherapeutic method and the difficulties of applying this to children, especially when very young. Therapeutic control of malaria in children can be carried out only in special cases and under very special conditions. The chemotherapy of various compounds of quinine, atebrin [mepacrine] and pamaquin is dealt with. Paludrine is not mentioned.

The third section of the book is given over to a clinical account of malaria in children at various ages and deals with general diagnosis, occult and congenital malaria and complications including hepatic cirrhosis, nephrosis and metabolic disturbances. There is a detailed account of the effects of malaria on the central nervous system illustrated by the author's own experience, and a sketchy account of anaemia and blackwater fever. The last section of the book deals with treatment.

An attempt is made here to set out some of the more interesting features of the book which, although written in a diffuse style, is nevertheless a very useful account of the subject and one which may be recommended to those concerned with the diagnosis and treatment of malaria. It is a pity that it is so poorly documented : the author refers to less than a score of books and papers, although it is clear from his text that he is himself conversant with the literature.

Fresh infections and acute attacks of malaria occur frequently, especially in younger children. The incubation period is the same as in adults and there are the usual prodromal symptoms. The temperature charts are erratic, especially in younger children. There is often disturbed sleep, frequent crying, a poor appetite and the general symptoms which may be confused with those of teething. The cold stage of classical malaria is uncommon in children. Coldness of the extremities with or without cyanosis is, however, common, with reactions which the author describes as " rigor without shivering." In older children shivers may occur just as in adults. The hot stage is also commonly prolonged in older children, and, in the very young, there may be high fever from the beginning of the attack.

An analysis is given of a hundred cases in which the fever reached more than 40°C. in 28 per cent. Fifty-six patients had high fever, 24 moderate fever, and under 20 were afebrile. Low temperatures were common in the subacute forms, especially in older children, and in the first stage in infection in sucklings and infants. The doctor who is not on the lookout for infant malaria may frequently mistake the disease for influenza or tuberculosis, and may completely miss the low-grade occult malaria.

Enlargement and hardness of the spleen is of special diagnostic importance, but final diagnosis depends on finding parasites in the blood.

An account is given of occult malaria in which there is a lack of obvious malaria symptoms. Occult malaria is more common in children than in adults, and prodromal symptoms, which are common in adults, may be missed in children, partly because they are subjective and may not therefore come to the notice of the doctor.

There is an interesting discussion on the history of congenital malaria and malaria in very young infants. The diagnosis of " congenital " malaria can be made only when the disease occurs in conditions in which infection by mosquitoes is impossible. In over ten years the author has had 14 cases in which the diagnosis of congenital malaria has been made with confidence ; these cases occurred in over 200,000 patients. The possibility of the appearance of congenital malaria, however, must not be overlooked, and the physician should carefully enquire about the malarial history of the mother. Accounts of cases are quoted, some of which occurred in children born during the malaria-free months in Ankara. It is recommended that in special cases drug prophylaxis should be carried out in malarial areas of Turkey during pregnancy. The author says that this is recommended not only in the hope of reducing the number of congenital cases but also the number of abortions which may themselves be due to the much greater frequency of infection in the foetus than is realized. Atebrin is the drug of choice.

Malaria in sucklings and very young children needs considerable attention. Typical rigors do not occur in sucklings, but they have as their equivalent " fever cramps " which, of course, are not uncommon in other diseases. Temperatures are often low in comparison with the fevers of other diseases. On the other hand, especially in *vivax* malaria, enlargement of the spleen occurs rapidly. Temperature charts are not usually characteristic of malaria at this age. In fact, if the doctor is presented with a low fever in a sick child he should automatically think of malaria. There is a discussion on the various forms of fever which develop in this age group.

A particularly common characteristic of malaria in sucklings, which is also common in the young age group, is dyspepsia and enteritis. Such malarial intestinal disturbances represent a considerable percentage of so-called " summer diarrhoeas " in children. In these cases parasites will be found in the blood and there will be a specific response to anti-malarial drugs. Both acute and subacute forms exist. A case is described of a child aged six months, admitted to hospital because of severe diarrhoea which had been going on for some days. The child had been raised exclusively on the breast. Until four weeks before admission it was in good health and going well. Since then it had become restless, was crying, sweating, and suffering from loss of appetite and ceaseless diarrhoea. On examination the child was in fairly good condition, spleen one finger below the rib margin, temperature 37·9°C. and *P. vivax* was present in the blood. On the third day of atebrin treatment the diarrhoea stopped.

A further interesting case is that of a child one and a half years old who was ill for months with diarrhoea, the stools, which were sometimes watery, containing blood and mucus. On admission the temperature was 38·4°C., the spleen was just palpable below the costal margin. The patient was treated with anti-dysenteric serum, glucose infusions, bacteriophage, and control of the diet. The diarrhoea responded, but began again on the tenth day with the passage of much blood. No organisms were found in the stools, but on the sixteenth day *P. vivax* was discovered in the blood. After antimalarial treatment the temperature fell to normal and quick recovery from diarrhoea took place.

The examples quoted are only a f w of many cases which indicate that the children's doctor in endemic areas should be aware that enteritis in sucklings

and young children may result from malaria. In the treatment of such conditions the author recommends the parenteral use of drugs, because, according to him, the drugs may not be well absorbed in very young children, particularly when they are suffering from diarrhoea.

The toxic effects of malaria in sucklings are discussed in detail and mention is made of interference in carbohydrate metabolism during malaria. There is little in these sections which needs comment.

The effects of malaria on the central nervous system in children are most striking. These disturbances often appear suddenly in apparently healthy children, and the fate of the child is often settled in a matter of a few hours. Sometimes the development is slower. Diagnosis is often missed and differential diagnosis is difficult. The author gives a table of the various central nervous system complications which may develop, *viz* :—

The Nervous Complications of Malaria in Children :—

A. *Coma prodromal stage.*
   1. Cephalalgic form (headache only).
   2. General asthenia, apathy, feeling of illness, nausea, usually with headache, hypersensibility and hyperaesthesia, eventually vomiting.

B. *Coma.*
   3. Coma with slow onset.
   4. Fulminating coma (so-called " Sunstroke " or " Apoplexy ").
   5. Meningitis form (including Ophthalmoplegia).
   6. Encephalo-meningitic form.
   7. Infantile toxic malaria.
   8. Typhoid-type malaria.
   9. Epileptic form (convulsion) with epileptiform onset merging into coma.
   10. Tetanic form.

C. *Lesions with a more or less subacute course.*
   11. Neuritic form.
   12. Hemiplegic form.
   13. Athetotic form.
   14. Amblyopia.
   15. Ophthalmoplegia (see also B5).
   16. Neuropathic form.
   17. Psychoses.

The tremendous importance of correct diagnosis is emphasized. Many interesting case histories are given, including a number illustrating what the author describes as " fulminating coma". An apparently healthy child playing in the streets develops severe cramps and deep coma. In hot countries this may often be mistaken for sunstroke, which, in fact, may be associated with it. The author stresses that in all cases where sunstroke is suspected, blood examination must be made. If such examination is impossible, treatment should be started without delay. He recommends quinine injections. As an example of this type of case he quotes the history of a child of seven years who became ill while playing at home. He fell down suddenly, became immediately unconscious, and was brought into the clinic at once by neighbours. On examination there were very severe clonic cramps of the extremities, trunk and face. The child was deeply unconscious, the pupils constricted and non-reactive to light. He was vomiting, the spleen was enlarged, the temperature 41°C., and the blood showed *falciparum* parasites. The cerebrospinal fluid was under high pressure, there was an increase of cells, a small increase in albumin (40 mgm. per cent.), and a considerable increase in sugar content (180 mgm. per cent.). After lumbar puncture, the cramps lessened in

intensity, but coma persisted. Intravenous and intramuscular quinine injections were followed by rapid recovery.

The author stresses the point that the meningitic form of malaria coma is relatively common in children, and that therefore cases may easily be mistaken for meningococcal or tuberculous meningitis. He recommends lumbar puncture in such cases, not only as a diagnostic procedure but also because the pressure is raised in most malarial cases and should be relieved. He discusses the relation of the blood and cerebrospinal fluid sugar concentrations. In 42 cases with nervous complications in malaria, 38 showed an increase in cerebrospinal fluid sugar.

Psychosis as a result of malarial infection is apparently less frequently met in children than in adults. Acute psychoses, however, do occur and may be present in the prodromal stages of the attack. Case histories are quoted.

Possibly one of the commonest effects of malaria in children is the production of some degree of anaemia. The colour index may be equal to, slightly greater, or less than one, and the red blood cell picture shows general reduction of numbers, together with poikilocytosis, anisocytosis, and polychromasia. Megalocytes may be present in *vivax* malaria, and, according to the author (in contrast to most observers), normoblasts are rare, which he regards as an indication of severe damage to the haemopoietic system. Severe anaemia in children as the result of malaria is commoner in some regions than in others. In the author's polyclinic, among 4,200 cases, there were 112 with haemoglobin between 10 and 35 per cent.

The white blood cell picture depends on the degree and state of the infection. Leukopenia is characteristic in the acute stage.

The author recommends treating anaemia by treatment of the malaria plus the administration of liver preparations and extracts of iron and copper. In very severe cases blood transfusion may be necessary. In the newborn and young sucklings 50 to 100 cc. of blood should be given ; in very young children, 100 to 200 cc. ; in school children 200 to 400 cc.

Blackwater fever may occur as a complication in children, the signs and symptoms differing little in detail from the similar condition in adults.

Treatment of malaria in children is discussed in detail. Doses of quinine : in sucklings from birth to two months, 30 to 50 mgm. per day ; from three to twelve months, 50 to 100 mgm. per day ; in young children of one to five years, 100 to 300 mgm. per day ; in school children of six to fourteen, 500 to 800 mgm. or as much as 1,000 mgm. per day. In general, the author reckons the quinine dosage as 100 mgm. per year of life ; child of eight, for example, would have up to 800 mgm. in the day. Certain non-bitter compounds of quinine are recommended.

Atebrin should be given after food with plenty of fluid. The treatment should continue from five to seven days. Children up to the age of four may be given up to 100 mgm. per day ; from four to eight, 200 mgm. ; over eight 300 mgm. The author has observed nervous changes, including general sleepiness, in some sucklings taking atebrin, and in one child of four years ataxia of the lower extremities and ulnar involvement, with recovery after two months. Behaviour changes were observed in a child of nine years who was treated for six days with atebrin, 300 mgm. per day. This child became disorientated and had hallucinations. He was unaware of his surroundings and any kind of understanding with him was impossible. He became apathetic, had to be forcibly fed, and was incontinent of urine and faeces. After some days he recovered.

The dosages of pamaquin mentioned are those given by Nocht. In the upper age groups these are rather higher than are usually given to adults in Britain. For example, between the ages of six to fifteen, 10 mgm. from

three to five times in the day are recommended. The author points out that toxic symptoms may possibly occur with these dosages. This is hardly surprising.

At the end of the book there are some quite useful illustrations showing various methods of protection against malaria by screening, and photographs of children suffering from malaria, illustrating enlargement of spleen, toxicity in sucklings, liver cirrhosis, typhoid malaria, meningitic and encephalitic malaria, etc. *B. G. Maegraith*

ONABAMIRO, Sanya Dojo [B.Sc. (Manchester), F.L.S.]. **Why our Children Die. The Causes, and Suggestions for Prevention of Infant Mortality in West Africa.** With a Foreword by Lancelot HOGBEN. pp. xi+196. 1949. London: Methuen & Co., Ltd., 36, Essex Street, Strand, W.C.2. [8*s.* 6*d.*]

That infant mortality rates are high in tropical Africa is widely known, but few people, European or African, even if they have lived their lives in Africa, realize the extent of the wastage and tragedy of infant and child deaths. Nor is it only ignorance of the facts that delays and retards measures for improvement. Many Africans, even among the well-educated, accept as inevitable the appalling conditions. The main aim of this little book, written by a Nigerian zoologist, is to bring home the facts of infant and child mortality to the rapidly increasing number of educated men and women in British West Africa and to awaken them to the realization that most of these deaths are avoidable and that measures for eradication of the main causes can and should be unde taken at once.

As is the case throughout most of tropical Africa the vital statistics available for the four British territories on the west coast are very incomplete. Maternal and infant mortality data are recorded in annual reports but refer only to a small proportion of the population, that of the large towns and such few rural areas as are served by a hospital or mission. Even these are very high and such scanty evidence from the rest of the countries as can be gathered together suggests that the overall infant mortality rate for such territories as Nigeria and the Gold Coast is probably not less than 40 per cent. or more than six times as high as the rate in the United Kingdom.

After summarizing the available statistics the author turns to the causes of the high mortality rates. Among these he first deals with African methods of midwifery. Here the author has been unusually fortunate: there can be few scientists who have been present at deliveries carried out by village medicine-men. His description of what takes place on these occasions is fascinating and probably unique. The actual methods of delivery of normal cases, being mainly natural, are open to relatively little objection, but the complete inability to deal with even the minor deviations from normal leads to many fatal results, and the risks to the infant of infection and exposure, in the insanitary surroundings and during the handling by innumerable friends and relatives, are tremendous.

The child's chances of survival are largely dependent upon the mother's health during pregnancy, and its own exposure to disease in its early months of life. In both respects the scales are heavily weighted against it. Many West African women bear children at far too early an age and, during pregnancy, live in great poverty, in insanitary surroundings, doing most unsuitable work and exposed to a wide range of endemic diseases. Above all, malnutrition and undernutrition are widespread throughout whole populations. This has a particularly adverse effect during pregnancy, as not only are the requirements greater at that time, but in many areas customs and taboos limit the food of the expectant mother.

Similarly, during its early struggles the infant has to contend with a host of adverse conditions. Water-borne diseases, insect-borne diseases, skin and respiratory tract infections, and helminthic and protozoal infections all contribute their share to high infant mortality rates.

The longest chapter in the book is devoted, probably rightly, to malnutrition as the most important single contributory factor to high infant and child death rates. The author describes in considerable detail the nature, functions and sources of all the known vitamins and indicates how greater quantities of these nutrients might be included in African diets. Understanding of this chapter demands a much higher level of scientific knowledge than does the rest of the book, and it may be that it will lose some of its effect from being above the heads of many readers. It would have been better to treat the subject from the point of view of foods rather than of nutrients. Moreover, there is lack of balance here in that many pages are devoted to consideration of the vitamins, whereas protein and mineral deficiencies are dismissed in a few brief paragraphs, and pure caloric undernutrition, still probably the most common dietary defect in Africa, receives no mention at all.

In his final chapter of conclusions and suggestions the author wastes little time in apportioning blame for the existing conditions, though he does point out that these conditions do little credit to British Colonial Governments. The ultimate solution of the problems lies in a many-sided attack upon poverty, disease and ignorance. Improvement will come through economic advancement, extended medical and maternity services, a wide programme of sanitary legislation and by education at every level and by all available means.

There are many points of detail in this book that could be criticized, but they are unimportant compared with the urgency of its message and complete conviction conveyed by the author. It is only to be hoped that the book achieves the wide circulation and active attention it deserves. Nothing in it is more eloquent than the dedication, " To my mother, of whose eight children seven died in infancy. . . ." *Dean A. Smith*

SOUTH PACIFIC BOARD OF HEALTH. **A Guide to Pacific Island Dietaries.** [Compiled by J. C. R. BUCHANAN]. pp. viii+75. 1947. Suva, Fiji.

This little handbook was originally intended for the use of the students and graduates of the Central Medical School in Suva, but it is hoped that it will reach a far wider range of readers. Nurses, teachers, health sisters, welfare workers, members of the public, and all in the area who are able in any way to exert an influence for the better use of food will find it of the greatest value and interest.

The book opens with a chapter on general principles. This is written at a semi-popular level, is brief but adequate, and avoids the major pitfalls of inaccuracy which often appear in the simple presentation of a complex subject.

The chapter on common Pacific Island foodstuffs contains much information and includes descriptions of methods of cooking and utilization as well as of the foods themselves. This information is made use of in the dietary scales which follow ; they are sound, realistic rations made up of readily-available local foodstuffs, based on food categories, and covering the needs of a range of sex, age and activity groups. The book ends with a table of food values and a selected bibliography.

The food tables contain a few slips, which will, no doubt, be corrected in the next edition (*e.g.*, p. 66. Soursop : Protein 0·1 gm. fat 0·4 gm. carbohydrate 17 gm. calories 0) and there is some confusion in the calculation of values for vitamin A and carotene, but these very minor criticisms should not be held to detract in any way from the value of the work. It is as good a popular book as any yet written on the local foodstuffs of an area. *Dean A. Smith*

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